PB90-162652

Superfund Record of Decision (EPA Region 5): Cliff/Dow Dump Marquette, MI. (First Remedial Action), September 1989

(U.S.) Environmental Protection Agency, Washington, DC

27 Sep 89

U.S. Department of Commerce
National Technical Information Service
NTIS

PB90-162652

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-89/100
September 1989

EPA

Superfund Record of Decision:

Cliff/Dow Dump, MI

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SPRINGFIELD, VA. 22161

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Washington, D.C. 20460

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The municipally owned 2-acre Cliff/Dow Dump site is in a wooded recreational area adjacent to the Dead River in Marquette, Michigan. From 1954 until the early 1960s wastes generated by the Cliffs-Dow Chemical Company's charcoal manufacturing plant were deposited at the site. The wastes, which included tar and tar-contaminated fill materials, were deposited to fill a small bog depression. The 200 cubic yards of exposed tar deposits are the primary source of contamination in the soil; however, the remaining 9,400 cubic yards of fill material containing charcoal and wood intermingled with approximately 200 cubic yards of tar, are also a contamination source. Results of pilot studies indicate that ground water is undergoing in situ biodegradation as it flows downgradient of the fill and poses no risk to human health or the environment. The primary contaminants of concern affecting the soil are VOCs including benzene, toluene, PCE, and xylenes; and other organics including PAHs and phenol.

The selected remedial action for this site includes excavation and offsite incineration of 200 cubic yards of exposed tars; excavation of 9,400 cubic yards of fill material intermingled with tars, and segregation followed by offsite incineration of 200 cubic yards of buried tars encountered during the excavation; forced aeration biological treatment of the 9,200 cubic yards of residual (See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision - Cliff/Dow Dump, MI
First Remedial Action - Final
Contaminated Media: soil, gw
Key Contaminants: VOCs (benzene, toluene, PCE, xylenes), other organics (phenol)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report) None

20. Security Class (This Page) None

21. No. of Pages 104

22. Price A06

(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

16. Abstract (continued)

contaminated fill material after replacement in the excavated area; installing a soil cover and revegetation of bioremediated fill area; implementation of institutional controls including deed restrictions preventing new well installation and disturbance of fill material until health-based goals have been achieved; and ground water and air monitoring. The estimated present worth cost for this remedial action is $2,842,165, which includes estimated annual O&M costs of $63,280.

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Frank Rovilns
FTS 856-4663

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

* *

RECORD OF DECISION

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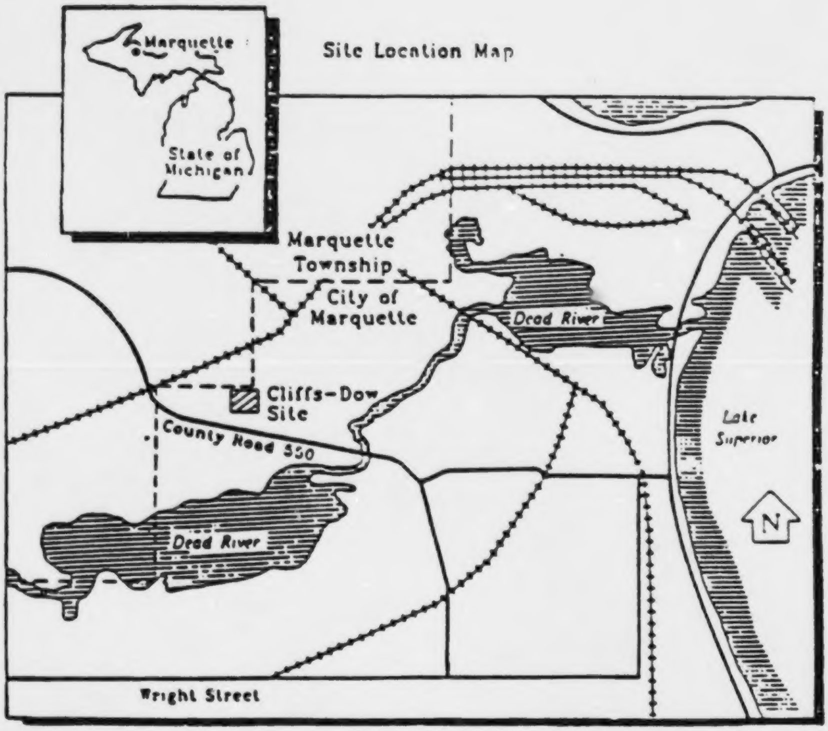
CLIFFS-DOW DISPOSAL SITE

MARQUETTE, MICHIGAN



Site Location Map

Marquette
State of Michigan
Marquette Township
City of Marquette
Dead River
Cliffs-Dow Site
County Road 550
Dead River
Lake Superior
N
Wright Street

RECORD OF DECISION

SITE NAME AND LOCATION

Cliffs-Dow Disposal Site
Marquette, Michigan

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Cliffs-Dow Disposal site in Marquette, Michigan, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Contingency Plan (NCP). The decision is based on the Administrative Record for the Cliffs-Dow Disposal site. The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

The State of Michigan has been consulted and concurs with the selected remedial action.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the remedial action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF SELECTED REMEDY

The selected remedial action for the Cliffs-Dow Disposal site addresses the source of the contamination by remediation of on-site wastes and residual contaminated fill material. The major components of the selected remedial action include:

* Excavation and treatment, via incineration, of approximately 200 cubic yards of tar.

* Excavation, segregation and treatment, via incineration, of approximately 200 cubic yards of buried tar.

* Excavation and treatment, via enhanced biological treatment of approximately 9,200 cubic yards of residual contaminated fill material.

* Topsoil cover and revegetation of bioremediated fill area.

* Site deed restrictions that prevent installation of drinking water wells within the vicinity of the contaminated

groundwater boundaries and disturbance of fill material until health based remedial action goals have been achieved.

- Groundwater/air monitoring program to confirm the adequacy of enhanced biological treatment of residual contaminated fill material and in-situ bioremediation of residual groundwater contamination.

USE OF BIOLOGICAL TREATMENT IN LIEU OF OFF-SITE DISPOSAL

All factors considered, U.S. EPA has determined that enhanced biological treatment of residually contaminated fill material is a viable innovative treatment technology for contamination such as that found at the Cliffs-Dow Site. The enhanced biological treatment will be completely evaluated during remedial design and shall provide for protection of public health and the environment within U.S. EPA's acceptable risk range of 10^{-4} to 10^{-7}, with a preferred point of departure of 10^{-6} for potential carcinogens, and provide for a cumulative health index less than one for non-carcinogens. If, based upon remedial design pilot studies, U.S. EPA determines that these health based goals are not achievable via enhanced biological treatment, then off-site disposal and/or other treatment technologies will be required.

STATUTORY DETERMINATIONS

Consistent with CERCLA and, to the extent practicable, the NCP, 40 C.F.R. Part 300, the selected remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment and reduces toxicity, mobility, or volume as a principal element. Because this remedy will result in hazardous substances remaining on-site above health based levels, the five year review will apply to this action.

Valdas V. Adamkus
Regional Administrator

September 27th, 1989
Date

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
CLIFFS-DOW DISPOSAL SITE
MARQUETTE, MICHIGAN

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SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
CLIFFS-DOW DISPOSAL SITE
MARQUETTE, MICHIGAN

I. SITE NAME, LOCATION AND DESCRIPTION

The Cliffs-Dow site is located in a wooded area off County Road 550, about one mile north of the City of Marquette, in the upper peninsula of the State of Michigan. The two acre site, bounded by the Dead River and currently owned by the City of Marquette, is zoned for recreational use. Most of the recreational activity is concentrated along the river and associated with sport fishing. The area around the site is largely undeveloped. A small area to the east of the site, and property to the north of the study area is zoned industrial. A tourist park, operated by the City of Marquette, is located south of the site across the Dead River. See Figure 1 for site location and Figure 2 for a land use map of the study area.

The area of fill deposition consists of what appears to have been a small bog depression with a total area of under two acres. After filling in the bog depression, the area of waste disposal is generally level and vegetated with grasses, shrubs, and small trees except for the areas of exposed tars. Geophysical surveys indicate that the waste occupies approximately 1.4 acres with a thickness of between twelve and sixteen feet. The depth of the waste is greatest at the center and slopes upward toward the edges, approximating the shape of a shallow bowl. The total volume of fill is estimated at 9,600 cubic yards.

The tar deposits are the primary source of contamination at the site. The remaining fill material, containing charcoal and wood with intermingled tars, is also a contamination source. There are a total of three areas of exposed tars in the fill area (see Figure 3). Two are in depressions below the grade of general relief of the fill area and the surrounding topography. The third area is small, isolated, and appears to be a shallow (less than four inches) surface deposit. The total volume of exposed tar material is estimated at 200 cubic yards. The actual quantity of residual tars (currently non-exposed tars intermingled with fill material) is also estimated at 200 cubic yards.

Figure 1

Site Location Map

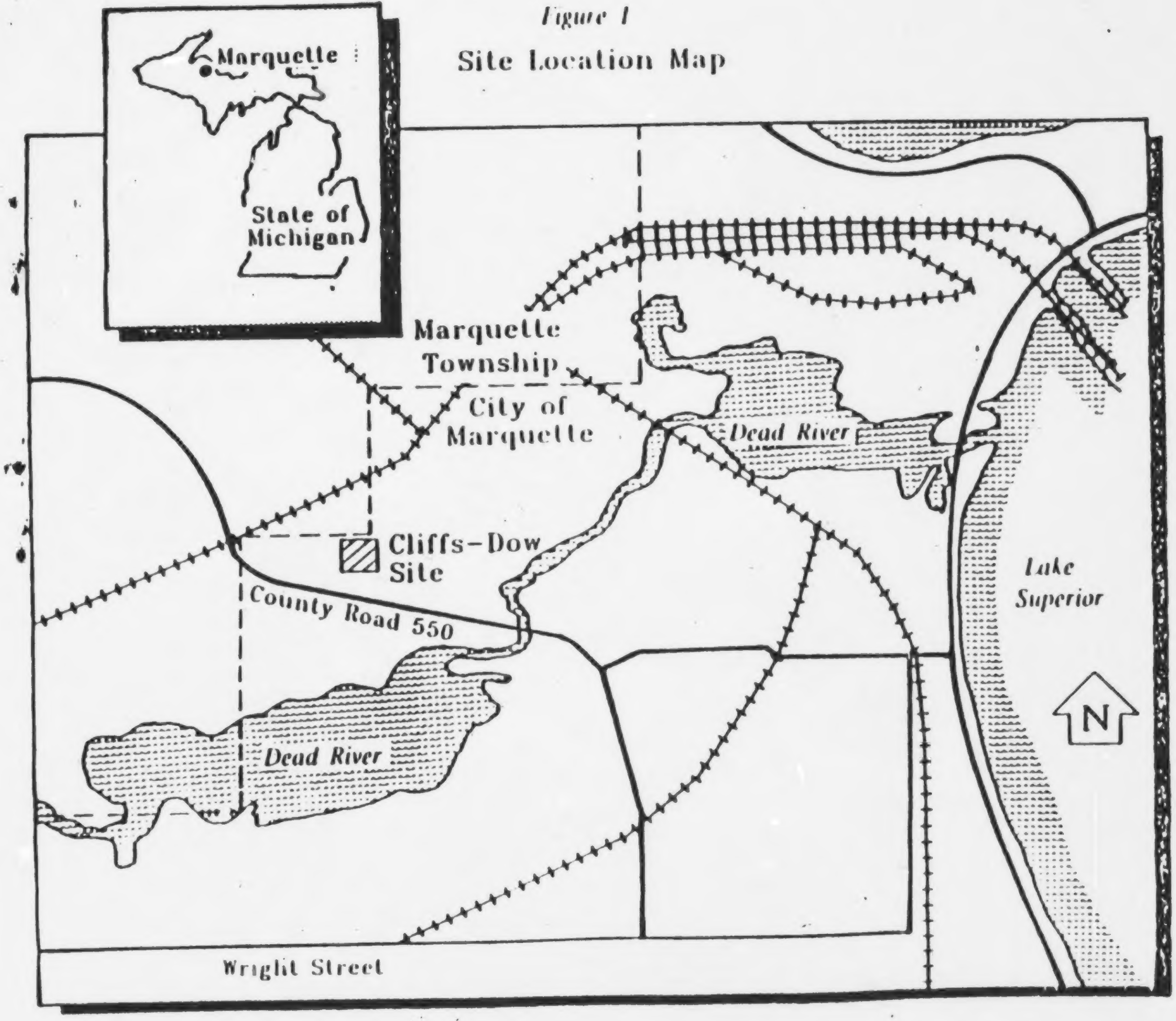
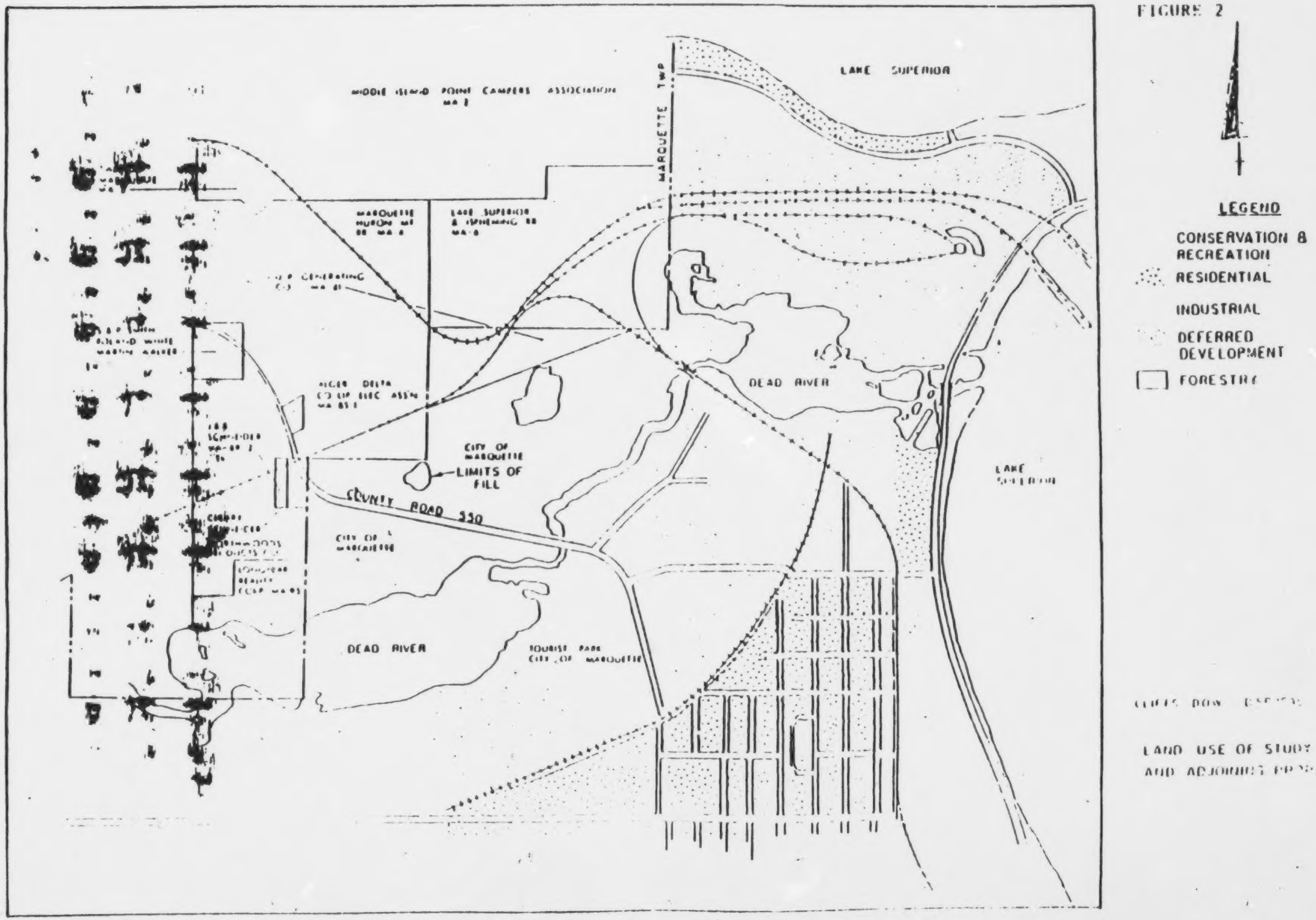

Marquette
State of Michigan
Marquette Township
City of Marquette
Cliffs–Dow Site
County Road 550
Dead River
Dead River
Lake Superior
N
Wright Street

FIGURE 2


LEGEND
CONSERVATION & RECREATION
RESIDENTIAL
INDUSTRIAL
DEFERRED DEVELOPMENT
FORESTRY
LAKE SUPERIOR
MARQUETTE TWP
MIDDLE ISLAND POINT CAMPERS ASSOCIATION
MARQUETTE HURON MT RR
LAKE SUPERIOR & ISHPEMING RR
ALGER DELTA CO OP ELEC ASSN
CITY OF MARQUETTE
LIMITS OF FILL
COUNTY ROAD 550
DEAD RIVER
TOURIST PARK CITY OF MARQUETTE
LAKE SUPERIOR

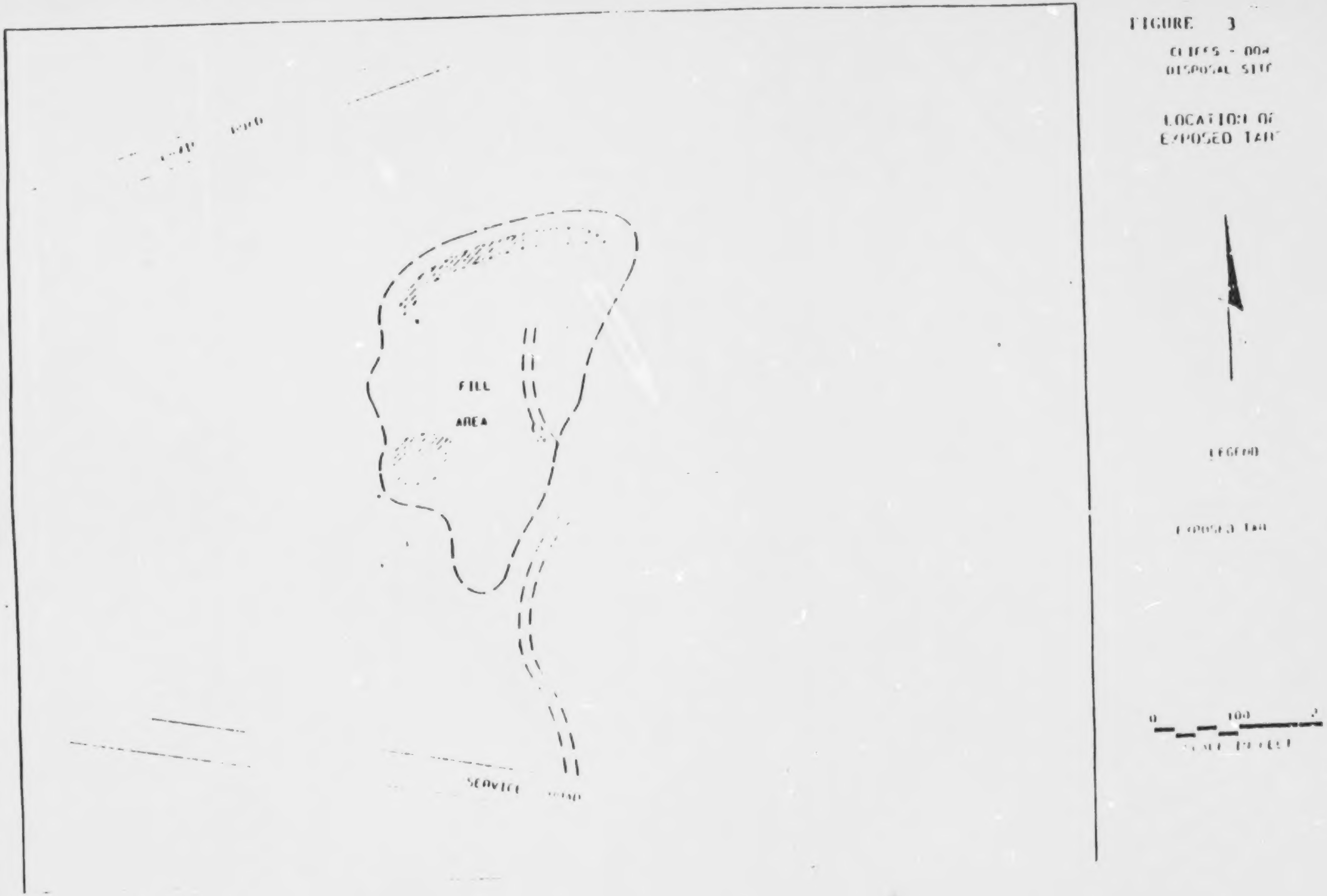
CLIFFS DOW [illegible]

LAND USE OF STUDY AREA
AND ADJOINING PROPERTY

FIGURE 3

CLIFFS - DOW DISPOSAL SITE

LOCATION OF EXPOSED TAR


ROAD
FILL
AREA
SERVICE ROAD
LEGEND
EXPOSED TAR
0
100
2
SCALE IN FEET

II. SITE HISTORY AND ENFORCEMENT ACTIVITY

From 1954 until the early 1960s, wastes generated by a charcoal manufacturing plant, the Cliffs-Dow Chemical Company, were deposited at the site. Hardwood harvested from area forests was converted into charcoal at the facility by heating the hardwood in the absence of air until the wood became pyrolyzed. The resulting solid product was processed as lump charcoal; vapors from the pyrolysis process were condensed, separated, and fractionated into primary products, such as acetic acid and methanol. Waste products consisted of charcoal scraps, unpyrolyzed wood fragments, and wood tars.

The fill area and surrounding property were owned and leased to the Cliffs-Dow Company for use as a disposal area, by the City of Marquette, the current title holder. The Dow Chemical Company and the Cleveland-Cliffs Iron Company were shareholders of the stock of the Cliffs-Dow Company. In 1968, these companies sold their shares to the Georgia-Pacific Corporation and the E.L. Bruce Company which continued to do business under the name of Royal Oak Charcoal Company.

The City of Marquette initially received a complaint regarding the site in the spring of 1981. Two people reported that their clothing became soiled with tar residue after their walk through the disposal area. The City initiated site investigations and referred the site to the U.S. EPA. In September 1983, the site was placed on the Superfund National Priorities List (NPL).

The U.S. EPA conducted a preliminary assessment of the site in May of 1982 and recommended in a report dated July 1983 that a snow fence be placed around the fill area to deter unauthorized entry.

A public meeting was held in Marquette on September 27, 1984, to discuss the work to be conducted under the Remedial Investigation/Feasibility Study (RI/FS).

On September 28, 1984, the U.S. EPA Region V Administrator signed a CERCLA 106 Administrative Consent Order stipulating the undertaking of a RI/FS and pre-design at the site to ascertain the extent of contamination and migration of contaminants at the site, an endangerment assessment to determine the actual or potential danger presented by the site to the public health, welfare and the environment, and prepare a pre-design package allowing for implementation of the selected alternative. Signatories (potentially responsible parties) included the following: Dow Chemical Company, the Cleveland Cliffs Iron Company, the Georgia-Pacific Corporation, and the City of Marquette. The signed Order for undertaking the RI/FS went out for public comment in October 1984. No comments were received during the thirty day comment period; the Order became effective thereafter. In November of 1984 a fence with warning signs was installed, and the RI/FS field work began. The RI report was completed in August of 1987 and placed in the Peter White Public Library repository for public viewing in March 1988. The FS was placed in the repository for public viewing on April 7, 1989.

On April 7, 1989, the U.S. EPA published, and placed in the repository for public viewing, a Proposed Plan for remedial action. A public availability session was held on April 25, 1989, to answer questions in regard to the Proposed Plan and a formal public hearing was held on April 25, 1989, to accept verbal public comment on the Proposed Plan. U.S. EPA accepted written comment on the Proposed Plan through July 5, 1989.

On February 28, 1989, prior to U.S. EPA's publication of the Proposed Plan, the Potentially Responsible Parties ("PRPs") who had signed the RI/FS Consent Order filed a Notice of Dispute with U.S. EPA pursuant to the dispute resolution provisions of the Order. The notice alleged, among other things, that U.S. EPA had failed to allow the PRPs an adequate opportunity to analyze the proposed alternative in the FS. U.S. EPA denied the existence of a dispute but met informally with the PRPs to address their concerns. On March 29, 1989, the PRPs filed a Complaint and Motion for Temporary Restraining Order and Preliminary Injunction against U.S. EPA in the U.S. District Court for the Western District of Michigan. The PRPs sought to prevent U.S. EPA from publishing the Proposed Plan, claiming that they did not have an adequate opportunity to comment on the proposed remedial action. Ruling from the bench at the hearing held April 3, 1989, Judge Hillman found that the PRPs were not likely to prevail on the merits of their case since courts generally do not have jurisdiction to review U.S. EPA's selection of a remedy until the Agency seeks to enforce it. The judge also found that the PRPs would not suffer any irreparable harm if U.S. EPA published the Proposed Plan. Finally, Judge Hillman determined that the PRPs' request was contrary to the public interest inasmuch as it would delay implementation of the remedy. The case has since been dismissed without prejudice.

III. COMMUNITY RELATIONS HISTORY

Since the Cliffs-Dow site is small, remote and little used, it is generally not perceived as a health threat by the public. Consequently, Superfund activities at the site have received minimal attention from the community and limited interest by local organizations and the media.

Community relation activities began with a public meeting held in Marquette on September 27, 1984, to discuss the work to be conducted under the RI/FS.

The signed Consent Order for undertaking the RI/FS went out for public comment in October 1984. No comments were received during the thirty day comment period; the Order became effective thereafter.

Following completion of the RI/FS the U.S. EPA published a Proposed Plan for remedial action on April 7, 1989. The RI/FS Report, Proposed Plan for remedial action and the Administrative Record, have been placed in an Information Repository located at the Peter White Public Library. Consistent with Section 113 of CERCLA, the Administrative Record includes all documents such as the work plan, data analyses, public comments, transcripts, and other relevant information used in developing remedial alternatives for the site. These documents were made available for public review and copying at the Peter White Public Library.

To encourage public participation in the remedy selection process consistent with Section 117 of CERCLA, the U.S. EPA initially set a 30 day public comment period from April 7, 1989, through May 6, 1989, for the Proposed Plan. The comment period was extended by U.S. EPA, due to informal requests from U.S. District Court for the Western District of Michigan, through July 5, 1989. for the Proposed Plan. An availability session was held on April 25, 1989, to answer questions in regard to the Proposed Plan and a formal public hearing was held on April 25, 1989, to accept verbal public comment on the Proposed Plan. Interested parties provided comments on the alternatives presented in the Proposed Plan and elaborated upon in the FS. The PRPs conducted a Supplemental Feasibility Study (SFS) to evaluate an alternative involving biological treatment of the fill material as an alternative to U.S. EPA's preferred excavation and off-site disposal of the fill. The remedy for the Cliffs-Dow site described herein was selected after a detailed review of the SFS and other public comments received. The attached Responsiveness Summary addresses those public comments received.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The FS identified four remedial objectives for the Cliffs-Dow site based on the data obtained by the Remedial Investigation and the possible exposure routes identified in the Endangerment Assessment. The objectives of the FS are:

1) To control airborne releases due to the volatilization of organic components from the areas of exposed and residual tars;
2) To prevent direct contact with exposed and residual tars;
3) To prevent consumption of contaminated groundwater; and
4) To prevent contamination of the surface waters down-gradient to the fill area.

Twelve actions were identified by the FS to satisfy the objectives. These potential actions were combined to formulate an array of remedial alternatives. These alternatives were screened and compared to each other and the remedial objectives to determine their ability to achieve the objectives.

The U.S. EPA further evaluated the FS array of remedial alternatives and selected seven remedial alternatives that would satisfy the objectives of the FS, meet health based clean-up levels and meet the statutory requirements of CERCLA. Six of the seven alternatives were identified in the FS; the seventh alternative is a combination alternative derived from component parts of the FS alternatives.

The SFS, conducted by the PRPs during public comment, evaluated a biological treatment alternative to address contaminated fill material. The U.S. EPA has identified an eighth alternative, based upon certain components of the biological treatment described in the SFS that would satisfy the objectives of the FS, meet health based clean-up levels and meet the statutory requirements of CERCLA.

Tables 8-1 through 8-7 lists the eight remedial alternatives that would satisfy the objectives of the FS, their component parts and costs.

The remedial action selected for the Cliffs-Dow site will eliminate the threats associated with direct contact with contaminated media. The role of the remedial action selected is a complete site remedy. When the remedial action is completed, no further remedial action at the site other than groundwater monitoring is envisioned. The monitoring of groundwater will be conducted to assure that the enhanced biological treatment fill material and in-situ biodegradation of residual groundwater contamination is occuring. Since hazardous substances above health based levels will remain in fill material at the site, until adequacy of biological treatment can be confirmed, a five year review will be necessary.

V. SUMMARY OF SITE CHARACTERISTICS

A. Site Characteristics

The area of fill deposition consists of what appears to have been a small bog depression with a total area of under two acres. After filling in the bog depression, the area of waste disposal is generally level and vegetated with grasses, shrubs, and small trees except for the areas of exposed tars. Geophysical surveys indicate that the waste occupies approximately 1.4 acres with a thickness of between twelve and sixteen feet. The depth of the waste is greatest at the center and slopes upward toward the edges, approximating the shape of a shallow bowl. The total volume of fill is estimated at 9,600 cubic yards.

The tar deposits are the primary source of contamination at the site. The remaining fill material, containing charcoal and wood with intermingled tars, is also a contamination source. There are a total of three areas of exposed tars in the fill area (see Figure 3). Two are in depressions below the grade of general relief of the fill area and the surrounding topography. The third area is small, isolated, and appears to be a shallow (less than four inches) surface deposit. The total volume of exposed tar material is estimated at 200 cubic yards. The actual quantity of non-exposed residual tars is also estimated at 200 cubic yards.

The RI included soil boring and sampling, geophysical surveying, installation of groundwater monitoring wells and elevation monitoring, and in-situ hydraulic conductivity testing (see Table 4 and Figure 4). Soil borings showed that the fill consists of wood and charcoal scraps mixed with tars and soil with tar deposits in the surface depressions. These soil boring samples were analyzed for compounds on the Hazardous Substance List. Those compounds consistently identified in the waste materials and considered to be potentially hazardous components are considered site indicator compounds. Table 1 lists the site indicator compounds.

Table 1
Site Indicator Compounds

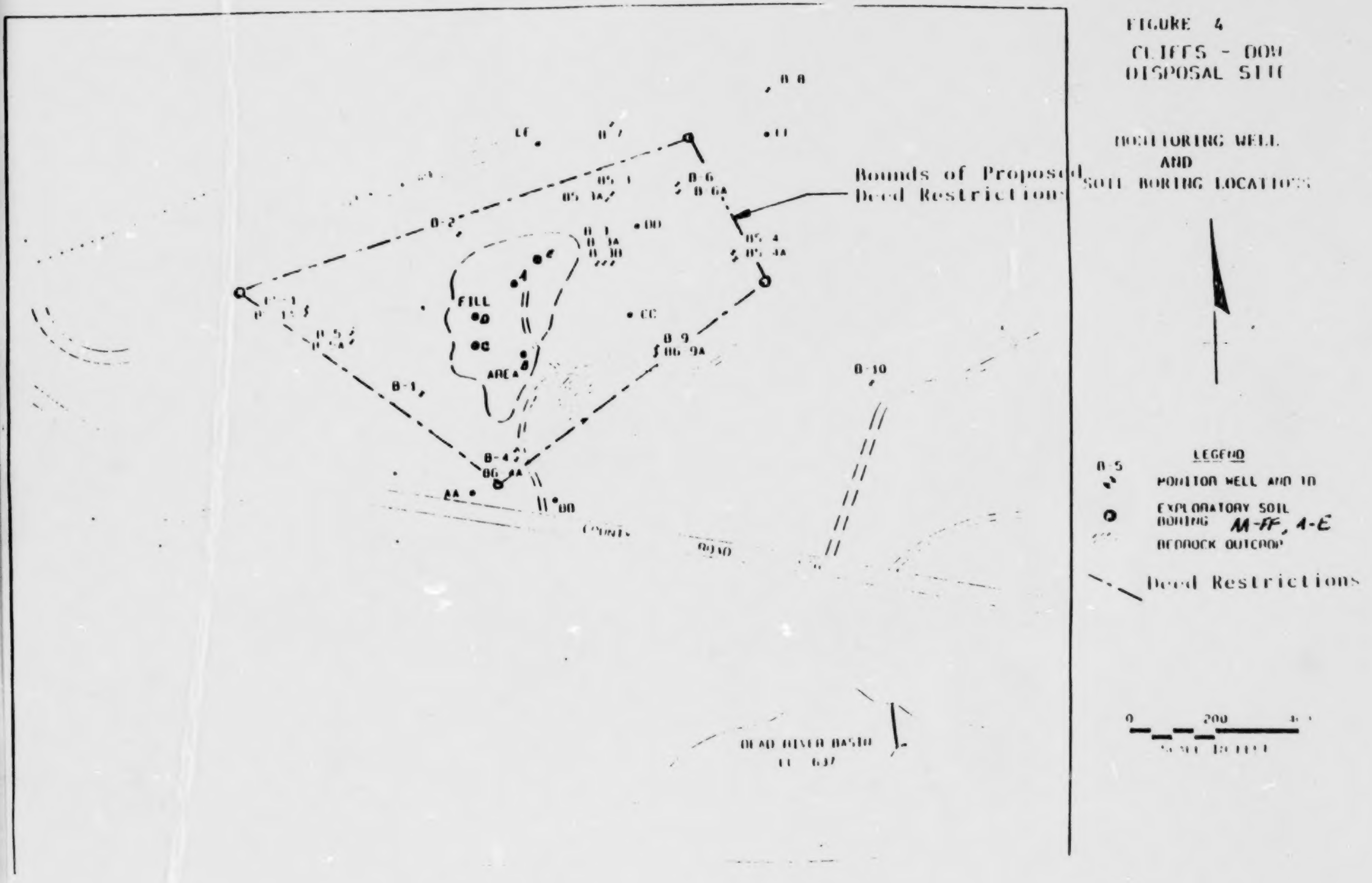
VOLATILES	ACID EXTRACTABLES	BASE NUETRALS
Benzene	Phenol	Naphthalene
Ethyl Benzene	2-methylphenol	2-methylnaphthalene
Toluene	4-methylphenol	Dibenzofuran
Xylene	2, 4-dimethylphenol	Phenanthrene
Tetrachloroethylene		Pyrene

Further investigations to determine the presence of site indicators included the advancement of soil borings and groundwater monitoring wells outside of

FIGURE 4

CLIFFS - DOW DISPOSAL SITE

MONITORING WELL AND SOIL BORING LOCATIONS


Bounds of Proposed Deed Restrictions
B-8
EE
B-7
B-11
B-6
B-6A
B-5
B-5A
B-2
B-1
B-1A
B-1B
DD
B-4
B-4A
FILL
D
C
A
E
AREA B
CC
B-9
B-9A
B-3
B-4
BG 4A
AA
BB
COUNTY ROAD
B-10
DEAD RIVER BASIN
EL 637
LEGEND
B-5
MONITOR WELL AND ID
EXPLORATORY SOIL BORING AA-FF, A-E
BEDROCK OUTCROP
Deed Restrictions
0
200
400
SCALE IN FEET

the fill area and subsequent analyses of soils and groundwater. Site indicators were not detected in soils at locations outside of the fill area. Air monitoring performed with a nonspecific portable field organic vapor detector detected no airborne waste components.

B. Area Hydrogeology

Information generated as part of the RI Report indicates that the hydrogeology of the site is characterized by a shallow, unconfined sand and gravel aquifer of relatively high hydraulic conductivity. The fill material was deposited, up to five feet below the water table, in the aquifer. The aquifer is bounded by a bedrock ridge on the eastern edge of the site. Two primary flow channels exist in the aquifer on the hydraulically downgradient side of the site. Water balance calculations estimate a sixty-six percent discharge through the northeast channel; this discharge becomes less significant during low flow.

Samples of ground water collected from monitoring wells advanced outside of the fill area locations (see Figure 4) were analyzed for site indicators. Detectable concentrations of the site indicators listed in Table 2 were present in the shallow well nearest to the fill (well 3A), the well in the path of the major (northeasterly) groundwater flow component through the site. Detectable levels were not present in the deeper screened well at that location.

TABLE 2 - Site Indicators at Well 3A

Indicator Compound	Levels (ug/l)
Benzene	4.0
2,4-dimethylphenol	860.0
Ethylbenzene	20.0
Toluene	7.0
Xylene	41.0
Phenol	220.0
2-methylphenol	570.0
4-methylphenol	250.0
Naphthalene	21.0
2-methylnaphthalene	1.0

Groundwater collected from well 85-4 located to the east and hydraulically downgradient to well cluster 3, contained residues of semi-volatile indicator parameters at detectable concentrations (see Table 3).

TABLE 3 - Site Indicators at Well 85-4

Indicator Compound	Levels (ug/l)
2,4-dimethylphenol	5.0
Phenol	3.0
4-methylphenol	11.0
Dibenzofuran (non-chlorinated)	2.0
Fluorene	2.0

Groundwater collected from wells 85-3, 85-3A, and piezometer B6, situated hydraulically downgradient to the fill and cross gradient to well cluster 3, contained no detectable residues of any of the site indicators. The waste components detected at well cluster 3, located in an area directly downgradient and adjacent to the fill, are being reduced to near or below detection limits by the time it migrates to monitoring well 85-4 which is within 350 feet downgradient of the fill. Based upon results of pilot studies, it is believed that the groundwater is undergoing in-situ biodegradation as it flows downgradient of the fill. Samples of groundwater collected from monitoring piezometers B4 and 86-4A, located along the path of a southeasterly groundwater flow component through the site, contained no detectable residues of site indicators.

VI. SUMMARY OF SITE RISKS

An endangerment assessment using information gathered during the course of the remedial investigation identified four potential exposure routes. The four routes that could transport waste components from within the site towards potential human and wildlife receptors at on and off-site locations are: 1) the airborne exposure route, 2) the direct contact exposure route, 3) the groundwater/surface water contamination route and 4) the groundwater exposure route. Each of the following sections focuses on a particular exposure route and evaluates the level of impact it represents.

1. The Airborne Exposure Route

The airborne exposure route, with exposed tars representing a potential source of airborne residues, presents a potential risk to wildlife such as the small mammals and birds that inhabit the interior of the site at locations near the exposed tars. There are, however, no designated critical habitats in the study area nor is there any evidence to suggest that the study area provide shelter or breeding for any endangered species. Based on the organoleptic (odor) threshold of the waste materials, published chronic and subchronic Acceptable Daily Intake values and the absence of potential human receptors to chronic exposures within the observed odor range of the airborne exposures, it was concluded that airborne emissions from the site did not represent an acute or chronic human health risk. Due to the low odor threshold of the waste components, however, the perceptible airborne releases of waste components from the site present an aesthetic problem. The odors could impact public welfare insofar as such smells discourage the use of the area for recreational activities. In fact, the site was first brought to the of public officials by hikers concerned with the odors in the area.

2. The Direct Contact Exposure Route

A measurable risk is associated with the direct contact exposure route, with exposed tars and tars within the residual fill materials representing the source and potential residents the potential receptors. The tar residue contains a nonspecific 1% mixture of indicator compounds, volatile organic compounds (VOCs), and acid extractable and base neutral compounds that could result in injury ranging from localized skin irritations to more systemic effects if large dose or long-term exposure occured. Although a barrier fence and warning signs exist around the site, the existing site condition does represent potential for human and wildlife health risks and requires consideration for remediation.

The indicator compounds detected in the tars and tars within the residual fill pose carcinogenic health risks based upon a lifetime ingestion scenario.

Risks posed by carcinogenic indicator compounds detected in the tars are presented in Table 6. The tars, both exposed and within the fill, pose a (2.09 x 10e-4) excess cancer risk. The U.S. EPA generally evaluates alternatives which fall within the (1 x 10e-4) to (1 x 10e-7) excess cancer risk range, with (1x10e-6) being the preferred point of departure. The risks posed by the tars do not fall within U.S. EPA's acceptable risk range and therefore will be considered for remediation.

The risks posed by lifetime chronic ingestion of noncarcinogenic indicator compounds are presented in Table 5 for tars and tars within the residual fill material. The noncarcinogenic risks are based upon an ingestion scenario for children and adults, and are compared to ratio of exposure level (EL) to the Acceptable Daily Intake (reference dose or RfD) for that indicator compound. This ratio, EL/RfD, is expressed as the Hazard Index (HI). The total noncarcinogenic risk to an individual is estimated by summing HI values for all indicator compounds. Hazard index values of 1.0 or less indicate that there is no significant noncarcinogenic risk, while a value larger than 1.0 indicates that noncarcinogenic effects may occur and requires consideration for remediation. The tars at the site have a HI value less than 1.0 and are currently within U.S. EPA's acceptable non-carcinogenic risk range.

3. The Groundwater Facilitated Surface Water Contamination Route

The groundwater facilitated surface water contamination route with potential contamination of the Dead River via groundwater discharge and surface water ponding of groundwater represents the source of risk to users of these waters. Groundwater at well 3A, located approximately 50 feet outside of the fill area, contains residues of benzene and 2,4-dimethylphenol in excess of ambient water quality criteria.

Groundwater modelling indicates that contaminant concentrations in down gradient wells are in equilibrium with the fill and contaminant concentrations; groundwater sampling and analyses confirm that the site contaminant indicators have not migrated more than four hundred feet downgradient of the fill.

The Dead River, bounding the site to the east and southeast at a minimum distance of 1000 feet, represents the downgradient groundwater receptor. Since contaminants will be reduced to below detectable levels before groundwater is discharged to the surface water, this source of risk is also minimal.

Consequently, there are no current or future human or wildlife health risks associated with the groundwater facilitated surface water exposure route.

4. The Groundwater Exposure Route

Based on data collected during the RI the groundwater exposure route does not currently pose a potential risk if contaminated groundwater, from a well placed within the vicinity and elevation of well 3A, is consumed.

If concentrations of indicator compounds were to increase and if drinking water wells were to be installed in the area downgradient of the fill, then this exposure route could become complete and risks could be present. This risk is presently limited, however, by the absence of human and wildlife users of groundwater in the area; there are no current residences nor current groundwater users in the study area. The nearest residences utilizing groundwater as a drinking water source are located about 750 feet west of the site. Review of the 1978 City of Marquette Zoning Ordinance indicates that no rezoning for residential or industrial use is planned for the immediate future.

Risks posed by carcinogenic indicator compounds are presented Table 6. The groundwater poses a (3.3 x 10e-6) excess cancer risk. The U.S. EPA generally evaluates alternatives which fall within the (1 x 10e-4) to (1 x 10e-7) excess cancer risk range, with (1x10e-6) being the preferred point of departure. The risk currently posed by groundwater falls within U.S. EPA's acceptable risk range, although it exceeds U.S. EPA's preferred point of departure.

The risks posed by lifetime chronic ingestion of noncarcinogenic indicator compounds present in groundwater are presented in Table 7. The noncarcinogenic risks are based upon an ingestion scenario for children and adults, and are compared to ratio of exposure level (EL) to the Acceptable Intake (reference dose or RfD) for that indicator compound. This ratio, EL/RfD, is expressed as the Hazard Index (HI). The total noncarcinogenic risk to an individual is estimated by summing HI values for all indicator compounds. Hazard index values of 1.0 or less indicate that there is no significant noncarcinogenic risk, while a value larger than 1.0 indicates that noncarcinogenic effects may occur and requires consideration for remediation. The HI for groundwater at the site is currently less than 1.0 and is currently within U.S. EPA's acceptable noncarcinogenic risk range.

There is an uncontrolled source of contamination on-site which leads to the potential for concentrations of indicator compounds to increase in the groundwater and there is a potential for the groundwater pathway to become complete and pose health risks if future zoning ordinances change. Therefore, the water requires consideration for remediation.

VII. DOCUMENTATION OF SIGNIFICANT CHANGES

Public comment received from the PRPs at the Cliffs-Dow Site included a Supplemental Feasibilty Study (SFS) to address contaminated fill material at the site. The SFS evaluated alternatives involving segregation of tars from the fill and biological treatment of residual contaminants within the fill material not presented in the original FS. The SFS was based primarily on information generated during the RI as well as supplemental efforts including test trenching and bench-scale biotreatability studies. The U.S. EPA has evaluated the information presented within the SFS and other public comments received and has incorporated a change into the U.S. EPA preferred alternative. As part of the Proposed Plan, U.S. EPA recommended off-site landfilling of the fill material. Based upon public comment, the U.S. EPA has incorporated the segregation of tars and biological treatment component for the fill material into this Record of Decision (ROD). The biological treatment of the fill would meet the remedial objectives as described in the Proposed Plan and Section IV of this ROD. U.S. EPA has included a description of Alternative H and an evaluation with respect to the nine evaluation criteria in Sections VIII and IX respectively.

Section 117(b) of CERCLA requires that the final remedial action plan be accompanied by a discussion of any significant changes in the Proposed Plan. Alternative H, as described in this ROD, is the U.S. EPA final remedial action plan for the Cliffs-Dow Site. Alternative H was not presented in the U.S. EPA Proposed Plan, yet the components of Alternative H could have been reasonably anticipated based upon the RI/FS and Administrative Record for the Cliffs-Dow Site, especially inasmuch as this change was responsive to comments submitted by the PRP's. The U.S. EPA has determined that the final remedial action plan presented in this ROD, Alternative H, is a logical outgrowth of those alternatives presented in the Proposed Plan.

The Responsiveness Summary attached hereto addresses the SFS and other comments received during the 90 day public comment period on the Proposed Plan.

VIII. DESCRIPTION OF ALTERNATIVES

The major objective of the FS, the Proposed Plan and the SFS was to evaluate remedial alternatives using a cost-effective approach consistent with the goals and objectives of CERCLA, as amended by SARA. Tables 8-1 through 8-7 present Summaries of Alternatives, including costs, for the Cliffs-Dow site.

Alternative A - (Alternative 1 in the FS) - No Action- in which no further work will be done at the site.

Alternative B - (Alternative 7 in the FS) - Excavation and thermal destruction of the exposed tars in an off-site incinerator; soil cover over the remaining fill materials; deed restriction; and a groundwater and air monitoring program.

Implementation of Alternative B requires the use of excavating and earth-moving equipment to remove an estimated 200 cubic yards of exposed tars from the site and transport them to a permitted off-site commercial or industrial incinerator. The excavation site would be backfilled, graded, covered with topsoil and revegetated to prevent erosion. The unexcavated fill area would be graded, covered with topsoil, and revegetated. The soil cover would serve to minimize direct contact with residual tars.

This alternative involves revision of the property deed to prevent the future use of the groundwater and to prohibit future disturbance of the fill, including the establishment of drinking water wells in the vicinity of the fill areas.

The groundwater monitoring program will use the existing monitoring wells installed during the Remedial Investigation, if practicable. The monitoring wells will be sampled on a semi-annual basis.

The air monitoring will be conducted during excavation and carried over for sampling on a semi-annual basis. The groundwater monitoring program is included to identify and quantify site indicator compounds and their degradation compounds which will provide information to evaluate the effectiveness of the remedial action implemented.

See Table 9 for the groundwater and air monitoring program guidelines.

The cost of the monitoring programs are included in the cost figure for the applicable alternatives (see Tables 8-1 through 8-7).

Alternative C - (Alternative 8 in the FS) - Impermeable cap over the area of the exposed tar materials; groundwater treatment system; fencing; and a groundwater and air monitoring program.

The two smaller areas of exposed tars at the southern border of the site will be excavated and relocated into the larger, northern tar area. When the consolidation of the tar areas is completed, the two excavated areas will be restored and an impermeable cap installed over the consolidated area. This cap consists of a 24-inch layer of compacted clay under 18 inches of native material with an impervious synthetic liner between the compacted clay and the native soil.

The groundwater treatment system will collect groundwater that has passed through the area of exposed tar materials through two 50 gallon per minute (GPM) collection wells located north and east of the site. The wells will be installed to a depth of 30 feet to intercept groundwater and pump it to an above-grade treatment plant. In the plant the air stripper removes the volatile components from the groundwater and discharges to the activated carbon filter for adsorption of residual contaminants. The uncontaminated effluent would then be released to a downgradient surface water concourse or municipal sewer system. Samples of the influent and discharge water, as well as air samples from the vicinity of the cap, would be collected (see air and water monitoring program in alternative B) and analyzed for the presence of site indicator compounds to determine the effectiveness of the remedial action. The treatment would continue for 30 years or until the sampling data indicates a sustained decrease in influent contaminant concentration to levels outlined under Alternative B. An eight foot high chain link fence will be erected around the capped area.

Alternative D - (Alternative 6 in the FS) - Excavation and off-site landfilling of the exposed tars; deed restrictions; and a groundwater and air monitoring program.

Implementation of Alternative D uses earthmoving equipment as described in Alternative B but the tars would be hauled to a secure, CERCLA off-site policy compliant, RCRA landfill for disposal. The deed restriction and monitoring program includes the same provisions as Alternative B.

Alternative E - (Alternative 11 in the FS) - Excavation and off-site landfilling of all fill materials; a groundwater treatment system; and a groundwater and air monitoring program.

Implementation of Alternative E involves complete excavation of fill materials. There will be an estimated 9600 cubic yards of fill material hauled to a secure, CERCLA off-site policy compliant, RCRA landfill for disposal.

The groundwater treatment component of this alternative would include the same provisions as Alternative C, except that the treatment program would address residual groundwater contamination.

The groundwater and air monitoring program would include the same provisions as Alternative B.

Alternative F - (Alternative 12 in the FS) - Excavation and off-site incineration of all fill materials; a groundwater treatment system; and a groundwater and air monitoring program.

Implementation of Alternative F involves complete excavation of fill materials. There will be an estimated 9600 cubic yards of fill material hauled to an off-site CERCLA/RCRA approved incinerator for thermal destruction.

The groundwater treatment component of this alternative would include the same provisions as Alternative C, except that the treatment program would address residual groundwater contamination.

The groundwater and air monitoring program would include the same provisions as Alternative B.

Alternative G - ("Hybrid" of Alternatives 7 and 11 in the FS) - Excavation and off-site incineration of tars and off-site landfilling of all remaining fill material; deed restrictions; and a groundwater and air monitoring program.

Implementation of Alternative G involves excavation and off-site incineration of all tars encountered during complete excavation of the fill material. For cost purposes it is estimated that 200 cubic yards of exposed tars and 200 cubic yards of residual tars will be off-site incinerated. There will be an estimated 9,200 cubic yards of fill material to be excavated and hauled to a secure off-site landfill for disposal.

The deed restriction and monitoring components of this alternative include the same provisions as Alternative B.

The groundwater and air monitoring program would include the same provisions as Alternative B.

Alternative H - ("Hybrid" of Alternatives 7 in the FS, Alternative G and Alternative H in the SFS) - Excavation and off-site incineration of exposed tars; excavation, segregation and off-site incineration of concentrated buried tars; enhanced biological treatment of the remaining fill material, soil cap and revegetation over treated material; deed restrictions; in-situ bioremediation of groundwater; and a groundwater and air monitoring program.

Implementation of Alternative H involves excavation and off-site incineration of all exposed tars, and excavation, segregation and off-site incineration of all concentrated buried tars encountered during complete excavation of the fill material. For cost purposes it is estimated that 200 cubic yards of exposed tars and 200 cubic yards of concentrated buried tars will be off-site incinerated. There will be an estimated 9,200 cubic yards of fill material to undergo enhanced biological treatment. Forced aeration biological treatment provides a basis for preliminary design; however, the specific biological process option actually implemented will not be selected until completion of remedial design (see Tables 12 and 13). Further treatability studies during remedial design phase will provide more extensive information for selection of the appropriate biological treatment method for implementation.

This alternative involves revision of the property deed to prevent the future use of the groundwater, including the establishment of drinking water wells in the vicinity of the fill areas, until health based remedial action goals have been achieved. The deed restrictions will also prohibit disturbance of the fill material during the biological treatment process, until health based goals have been achieved.

The groundwater and air monitoring program would include the same provisions as Alternative B.

IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

A. The Nine Evaluation Criteria

The FS examined twelve alternatives, and evaluated them according to technical feasibility, environmental protectiveness, public health protectiveness and institutional issues.

The U.S. EPA carried forth seven alternatives for evaluation in its Proposed Plan, the seventh alternative is a "hybrid" combination alternative created from those detailed in the Feasibility Study (FS). The SFS conducted by the PRPs during public comment evaluated enhanced biological treatment methods for the contaminated fill material. The U.S. EPA has identified an eighth alternative, a "hybrid" combination alternative based upon the SFS, that would satisfy the objectives of the FS, meet health based clean-up levels and meet the statutory requirements of CERCLA (see Tables 8-1 through 8-7).

The alternatives were evaluated according to the following nine criteria which are used by the U.S. EPA to provide the rationale for the selection of the final remedial action at a site:

1) **Overall Protection of Human Health and the Environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2) **Compliance with State and Federal Regulations (ARARs)** addresses whether or not a remedy will meet all the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provides grounds for invoking a waiver.

3) **Reduction of Toxicity, Mobility, or Volume** is the anticipated performance of the treatment technologies a remedy may employ.

4) **Short-Term Effectiveness** addresses the period of time needed to achieve protection, and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

5) **Long-Term Effectiveness and Permanence** refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

6) **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7) **Cost** includes estimated capital and operation and maintenance costs, and net present worth costs.

8) **State Acceptance** indicates whether, based on its review of the RI/FS and the Proposed Plan, the State concurs in, opposes, or has no comment on the preferred alternative at the present time.

9) **Community Acceptance** will be assessed in the Record of Decision following a review of the public comments received on the RI/FS report and the Proposed Plan.

B. Comparative Analyses of Alternatives

Each of the alternatives was evaluated using the nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of CERCLA (Cleanup Standards). Section 121(b)(1) states that, "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principle element, are to be preferred over remedial actions not involving such treatment. The off-site transport and disposal of hazardous substances or contaminant materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available." Section 121 of CERCLA also requires that the selected remedy be protective of human health and the environment, cost effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Each alternative is compared to the nine criteria in the following section:

1) **Overall Protection of Human Health and the Environment.**

All of the alternatives, with the exception of the No Action Alternative, would provide, with varying degrees of efficiency, an increased protection of human health and the environment, with respect to existing conditions. The increased protection is achieved by reducing percolation of surface waters and/or flow of groundwater through the contaminated fill material, thereby decreasing contaminant migration in groundwater. None of the alternative cover systems prevent the migration of contaminants that are in contact with the groundwater, although they would reduce the risk of direct contact with the fill material.

Excavation of all fill material, and either incineration or off-site landfilling, will eliminate further groundwater contamination and eliminate the direct contact risk, thus maximizing overall protection of human health and the environment. Alternatives E, F, and G provide such protection.

Incineration of exposed and buried tars in combination with enhanced biological treatment of contaminated fill material, will eliminate further groundwater contamination and eliminate the direct contact risk, thus maximizing overall protection of human health and the environment. Alternative H provides such protection.

(2) **Compliance with Applicable or Relevant and Appropriate Requirements (ARARS).**

SARA requires that remedial actions meet legally applicable or relevant and appropriate requirements of other environmental laws.

"Applicable requirements" means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. These laws include, but are not limited to the following: the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Solid Waste Disposal Act (RCRA), and any state environmental law that has more stringent requirements than the corresponding Federal law. "Relevant and appropriate" requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that, while not legally "applicable" to a hazardous substance, pollutant, contaminant, remedial action or circumstance at a site, address problems or situations sufficiently similar to those encountered at the site so that their use is well suited to that site.

"A requirement that is judged to be relevant and appropriate must be complied with to the same degree as if it were applicable. However, there is more discretion in this determination: it is possible for only part of a requirement to be considered relevant and appropriate, the rest being dismissed if judged not to be relevant and appropriate in a given case" (Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements, 52 FR 32496, August 27, 1987).

In addition to legally binding laws and regulations, many Federal and State environmental and public health programs also develop criteria, advisories, guidance and proposed standards that are not legally binding, but that may provide useful information or recommended procedures. These materials are not potential ARARs but are evaluated along with ARARs, as part of the risk assessment conducted for each CERCLA site, to set protective cleanup level targets. Chemical specific "To Be Considered" (TBC) values such as health advisories and reference doses will be used in the absence of ARARs or where ARARs are not sufficiently protective to develop cleanup goals. Other TBC materials such as guidance and policy documents developed to implement regulations may be considered and used as appropriate where neccessary to ensure protectiveness. If no ARARs address a particular situation, or if existing ARARs do not ensure protectiveness, to-be-considered advisories, criteria, or guidelines should be used to set cleanup levels.

Tables 10-1 through 10-9 include Federal and State ARARs and TBCs for the Cliff-Dow Site.

Alternative A does not meet any ARARs.

40 CFR Part 264 lists requirements for Hazardous Waste Management units under RCRA. Although the Cliffs-Dow Site was not regulated under RCRA, and the wastes are not listed or characteristic RCRA wastes, the fill material deposited at the site and contamination detected in groundwater contain hazardous constituents (site indicator compounds) identified in 40 CFR Part 261 Appendix VIII, which was the basis for listing RCRA F001, K022 and K035 wastes. Therefore, parts of 40 CFR Part 264 are relevant and appropriate for remedial alternatives at the Cliffs-Dow Site. Under 40 CFR Part 264 hazardous waste management units may be closed in one of two ways: a RCRA compliant cover system or "clean" closure corrective action.

Alternative B utilizes a non-RCRA soil cover over contaminated fill residuals which would not meet ARARs under 40 CFR Part 264.310.

Alternative C involves consolidation of exposed tars within the waste unit and placement of an impermeable cap on the exposed tars. The cap would not meet RCRA design requirements and would not cover all areas of contaminated fill; therefore, Alternative C would not meet ARARs under 40 CFR Part 264.310.

40 CFR Subpart B lists requirements for site security during a waste unit's "active life". Closure activities are included in the definition of "active life". For those alternatives in which contaminated fill remain on-site, Alternatives B, C, D and H, 40 CFR Subpart B is relevant and appropriate. Alternatives B, C, and D would not comply with this ARAR because the fill material would remain untreated and exceed health based standards. Alternative H would comply with this ARAR because fill material on-site would not exceed health based standards at completion of biological treatment.

General groundwater monitoring and corrective action requirements for waste management units are included in 40 CFR Part 264 Subpart F, and are relevant and appropriate for the site. This subpart requires a system of wells to detect hazardous constituents in groundwater downgradient of the waste unit. The detection of waste unit constituents downgradient could trigger the need for corrective action. Corrective action is required for all releases of hazardous constituents from any solid waste management unit. Data gathered during the RI indicates constituents beyond the contaminated fill area boundary.

All alternatives, except the No Action Alternative, include a groundwater monitoring program which would meet 40 CFR Part 264 Subpart F monitoring requirements.

Alternatives B, C and D leave contaminated fill above health based standards within the contaminated fill area which would continue to impact groundwater. Alternative C provides remedial action via groundwater treatment downgradient of the contaminated fill area, but does not address the entire source of contamination and ensure that hazardous waste constituents do not enter the groundwater. Alternatives B and D provide deed restrictions, extend the contaminated fill area point of exposure and prevent installation of drinking water wells within the contaminated groundwater area but do not provide for active groundwater remedial action. Alternatives B, C, and D would not comply with 40 CFR Part 264 Subpart F corrective action ARARs since contaminated fill remains on-site untreated.

Alternatives E, F and G provide complete excavation of fill material thereby eliminating the contaminant source and future migration of hazardous constituents into the groundwater. Alternatives E and F provide for groundwater treatment downgradient of the contaminated fill area. Alternative G provides deed restrictions, extending the contaminated fill area point of exposure and preventing installation of drinking water wells within the contaminated groundwater area. Alternatives E, F and G would comply with 40 CFR Part 264 Subpart F corrective action ARARs.

Alternative H provides for bioremediation of contaminated fill to acceptable health based standards thereby minimizing future migration of hazardous constituents into the groundwater. Alternative H provides deed restrictions, extending the contaminated fill area point of exposure and preventing installation of drinking water wells within the contaminated groundwater area. Alternative H would comply with 40 CFR Part 264 Subpart F corrective action ARARs.

40 CFR Part 264, Subpart L list requirements for waste piles. This ARAR is relevant and appropriate to Alternative H because the actual construction activities associated with this alternative would temporarily create such waste piles. The design of Alternative H, including enhanced biological treatment of the waste or off-site incineration of tars would comply with 40 CFR Part 264, Subpart L requirements.

Alternatives B, D, F, G and H involve the excavation and off-site transport of contaminated materials. 40 CFR Part 262, is relevant and appropriate for these alternatives classifying the site as a generator of hazardous waste. 40 CFR Part 263 lists transporter regulations which are relevant and appropriate to these alternatives. Alternatives B, D, F, G and H would comply with 40 CFR Part 262 and 263 ARARs.

The Safe Drinking Water Act (SDWA) has published maximum contaminant levels (MCLs) allowable in regulated public water supplies. The MCLs are relevant and appropriate for use at the site since the aquifer is a GWQG Class II type. Benzene is the only indicator compound detected in groudwater at the site which has a SDWA MCL. Benzene is currently below its SDWA MCL of five parts per billion. Tetrachloroethylene (PCE) was also discovered in on-site tars, and PCE and certain PCE degradation compounds also have SDWA MCLs.

Alternatives B through H provide a monitoring component to assure detection of compounds with SDWA MCLs, thereby assuring compliance with this ARAR.

The Clean Air Act sets maximum contaminant concentrations for airborne releases. Alternatives B through H provide air monitoring to evaluate air releases and assure compliance with this ARAR.

The Clean Water Act (CWA) 40 CFR regulates point source discharge to navigable waters. This Act is administered by the Michigan Department of Natural Resources (MDNR) under Michigan Act 245 and establishes surface water quality standards. The MDNR oversees point discharge standards as promulgated by the Federal NPDES program under this Act. Alternatives C, E and F, involving groundwater extraction, treatment and discharge would comply with this ARAR by meeting the substantive requirements for an effluent discharge permit and the terms and conditions of the permits effluent standards and limitations. This Act is not an ARAR for the other alternatives.

The Hazardous and Solid Waste Amendments (HSWA) to RCRA include provisions restricting land disposal of RCRA hazardous wastes. The purpose of the HSWA is to minimize the potential of future risk to human health and the environment by requiring treatment of hazardous wastes prior land disposal. The land disposal restrictions (LDRs) under HSWA are not applicable for those alternatives involving land disposal of fill materials or residual incineration ash because the wastes are not RCRA listed wastes or RCRA characteristic wastes. The Agency is undertaking a rulemaking that will specifically apply to soil and debris. Since the rulemaking is not yet complete, the U.S. EPA does not consider LDRs to be relevant and appropriate at this site to soil and debris that does not contain RCRA restricted wastes.

Federal "To Be Considered" Requirements ("TBCs")

Alternative A does not meet identified TBCs.

Alternative B, F, G and H involve sending materials excavated from the site to an off-site incinerator. The U.S. EPA off-site policy (OSWER Directive No. 9834.11) is a TBC for site remediation and will be followed to ensure that wastes are sent to a RCRA permitted incinerator.

Alternatives D, E and G involve sending materials excavated from the site to an off-site landfill. The U.S. EPA off-site policy is a TBC and will be followed to ensure that wastes are sent to a CERCLA off-site compliant RCRA permitted landfill.

The U.S. EPA Office of Groundwater has published Groundwater Classification Guidelines (GWCGs) which enable classification of all groundwater as Class I, II, or III, based on its use, value, and vulnerability. The surficial sand and gravel aquifer beneath the site would be classified as a Class II aquifer (current or potential source of drinking water). A Class II aquifer should be protected from contamination which might render the aquifer unusable or unacceptable as a source of drinking water. Therefore, contamination or degradation of the groundwater is unacceptable and should not be allowed to occur. The GWCGs are TBC for the site. Therefore, Alternatives B through H, have various components which would or could comply with this TBC. The U.S. EPA Environmental Criteria and Assessment Office has prepared the Integrated Risk Information System (IRIS) to provide health based and regulatory information on specific chemicals. IRIS provides chemical specific information which is utilized by U.S. EPA in risk calculations and development of health based cleanup goals and is TBC. The Tables presented in the FS and in this Record of Decision utilize IRIS values where appropriate. As presented in Alternatives E, F and G, the elimination of the direct contact threat by complete excavation of the contaminated fill area would comply with the health based cleanup goals developed utilizing the IRIS database. Alternative H, the elimination of the direct contact threat by treatment of tars via incineration and enhanced biological treatment of the remaining contaminated fill area would comply with the health based cleanup goals developed utilizing the IRIS database. The groundwater monitoring component of Alternatives B through H comply with the TBC health based cleanup goals developed utilizing the IRIS database.

The U.S. EPA Office of Emergency and Remedial Response, Office of Solid Waste and Emergency Response has prepared the Superfund Public Health Evaluation Manual (SPHEM) to provide methods and guidance in preparing health based risk assessments. The Tables presented in the FS and in this Record of Decision utilize the SPHEM where appropriate. As presented in Alternatives E, F and G, the elimination of the direct contact threat by complete excavation of the contaminated fill area would comply with the TBC health based cleanup goals developed utilizing the SPHEM. Alternative H, the elimination of the direct contact threat by enhanced biological treatment of the contaminated fill area would comply with the TBC health based cleanup goals developed utilizing the SPHEM. The groundwater monitoring component of Alternatives B through H comply with the health based cleanup goals developed utilizing the SPHEM.

The Great Lakes Water Quality Agreement (GLWQA) is a TBC because the site is completely contained within the Great Lakes drainage basin and the groundwater ultimately discharges to Lake Superior. Alternatives B through H provide groundwater monitoring to evaluate potential discharges of contaminated groundwater to the Great Lakes.

State of Michigan ARARs

Act 245 Part IV establishes surface water standards. Although no discharges to surface water are anticipated, the more stringent promulgated state standard, relative to the Clean Water Act-Water Quality Criteria, would be met for any such discharge to the nearest surface water discharge point. Act 245 Part IV is applicable to the site. All alternatives except the No Action Alternative involve monitoring to assure compliance with this ARAR.

Act 245, Part 9, Rule 323, involves registering critical materials. Alternatives C, E, and F involving groundwater treatment and discharge would comply with this ARAR.

Rule 607 requires a contingency plan and emergency procedures during site activities and is applicable to the site. All alternatives, except the No Action Alternative comply with this ARAR by providing for a Health and Safety Plan in accordance with the NCP.

Act 348 of 1965 and Administrative Rules defines requirements for air emissions during remedial actions and is applicable. All alternatives, except the No Action Alternative, comply with this ARAR by providing an air monitoring program.

Rule 613 is the state RCRA equivalent to 40 CFR Part 264 as previously described under Federal ARARs.

State of Michigan TBCs

Rule 602 involves environmental and human health standards which are applicable to the site. All alternatives, except the No Action Alternative comply with this ARAR and address on-site contamination to various degrees which would benefit human health and the environment.

Act 245, Part 22, Rule 323, involves groundwater quality rules including nondegradation of usable aquifers and is a TBC for site remediation. Alternatives A, B, and D would not comply with this TBC because contaminated fill remains in place untreated which potentially could continue to degrade groundwater quality. Alternatives C, E, and F would comply with this TBC because groundwater treatment is a component of these remedies. Alternative G would comply with this TBC because all contaminated fill is removed and groundwater monitoring would confirm the in-situ bioremediation of groundwater while deed restrictions prevent the installation of drinking water wells downgradient of the fill area. Alternative H would comply with this TBC because the tars would be treated via incineration and any residual contamination in the remaining fill would undergo enhanced biological treatment to health based standards and groundwater monitoring would confirm the in-situ bioremediation of groundwater while deed restrictions prevent the installation of drinking water wells downgradient of the fill area.

SARA Section 121(e) states that no permit shall be required for the portion of any remedial action conducted entirely onsite. It is the intent of the U.S. EPA to meet the substantive requirements of any permit related ARARs or TBCs. As such, the following regulations are defined:

Act 245, Part 21, Rule 323; waste or waste effluent discharge permit system; Act 346 of 1972, permit for constructing surface water discharge piping; and Act 348 of 1965, permit requirements for air discharges during remedial actions.

Based upon the above analysis, Alternatives E, F, G and H meet Federal and State ARARs and TBCs.

3) Reduction of Toxicity, Mobility, or Volume.

Alternative A, No Action, would not reduce the toxicity, mobility or volume of the fill area or contaminated groundwater.

Alternative B, by removing and destroying the exposed tar, would reduce the toxicity, mobility and volume of the exposed tars only. This alternative does not include treatment of groundwater. This alternative would not address unexposed tars mixed in with the fill remaining on-site. This remaining fill would provide an ongoing source for groundwater degradation.

Alternative C would not reduce the toxicity, mobility and volume of contaminants on site. It would limit the migration of on-site contaminants by capping them in such a way that would minimize surface water infiltration, leachate formation and resulting groundwater contamination in the area where the cap is constructed. The cap would not stop groundwater contamination which would result from groundwater flowing through the fill material deposited beneath the water table or infiltration through residual fill. The cap would prevent airborne migration of volatilized surface contaminants. Treatment of the groundwater would remove contaminants, thereby, reducing the toxicity, mobility and volume of contaminants migrating via the groundwater.

Alternative D, by hauling exposed tars to an off-site secured landfill, would not reduce toxicity, mobility and volume of contaminants. This alternative would only relocate the waste to a more secure environment. This alternative would not include treatment of groundwater. This alternative would not address the toxicity, mobility and volume of unexposed tars mixed in with the fill remaining on-site. This remaining fill would provide an ongoing source for groundwater degradation.

Alternative E, by hauling all fill materials to an off-site secured landfill, would not reduce on-site toxicity, mobility and volume of contaminants. This alternative would relocate the waste to a more secure environment without actually reducing toxicity or volume. Groundwater would be treated to remove contaminants, thereby, reducing the toxicity, mobility and volume of contaminant's migrating via groundwater.

Alternative F, by removing and destroying all fill material, would maximize reduction of toxicity, mobility and volume of contaminants. This alternative includes groundwater treatment to remove contaminants, thereby, reducing the toxicity, mobility and volume of contaminants migrating via groundwater.

Alternative G, by removing and destroying tars, would reduce the toxicity, mobility and volume of contaminants in the "concentrated" contaminant source. Excavation and off-site disposal of the remaining fill material would remove the remaining on-site contaminants to a more secure off-site environment. This alternative does not involve treatment of groundwater since the contaminant source is removed and contaminants already in the groundwater are expected to biodegrade to acceptable health based levels.

If contaminant concentrations in the groundwater do not decrease as expected, the monitoring program guidelines presented in Table 9 provide groundwater remedial action criteria.

Alternative H, by removing and destroying tars, would reduce the toxicity, mobility and volume of contaminants in the "concentrated" contaminant source. The biological treatment of the remaining contaminated fill would reduce the toxicity, mobility and volume of the remaining on-site contaminant source. The "concentrated" contaminant source, tars, are segregated from the fill and destroyed by incineration, and the residual contamination will undergo enhanced biological treatment. The contaminants already in the groundwater are expected to biodegrade to acceptable health based levels. If contaminant concentrations in the groundwater do not decrease as expected, the monitoring program guidelines presented in Table 9 provide groundwater remedial action criteria.

Thus, Alternatives E, F, G and H satisfactorily reduce the toxicity, mobility and volume of contaminants at the site.

4) **Short-Term Effectiveness.**

Alternative A, No Action, does not address contamination at the site.

The excavation and transport activities of Alternatives B, D, E, F, G and H may cause short-term effects due to noise from heavy equipment, dust, contaminant volatilization, disruption of the ecosystem, and the opportunity of direct contact with wastes by construction workers. The short-term risks for Alternatives E, F, and G would be greater because of the larger volume of waste removed and overall mileage for disposal. The short-term risks for Alternative H would be less due to minimal waste volume for transport.

Alternative C would prevent the release of volatile compounds and would treat groundwater contaminants. Installation of the cap would result in disturbances as discussed above in "excavation and transport".

The groundwater treatment activities of Alternatives C, E and F may cause short-term impacts from air emissions during installation and potential mechanical failure during its operation which could lead to surface discharge of contaminated groundwater. Groundwater contamination would be contained and reduced through treatment while in operation.

5) **Long-Term Effectiveness and Permanence.**

Alternative A, No Action, offers no long-term effectiveness or permanence.

Alternative B would remove only exposed tars, leaving contaminated fill in place with only a soil cover, thereby, minimizing long-term effectiveness and permanence. The deed restriction would protect against disturbance of the fill, including establishment of drinking water wells in the vicinity of the fill area, for as long as the restriction is in effect. Continuous professional management of the monitoring program would be required to assure a timely response if action should be required. The soil cover would not provide sufficient protection from precipitation and infiltration, and subsequent migration of contaminants from the residual fill. The monitoring program management is further complicated by residual fill contamination and its effect on groundwater.

Alternative C would require long-term maintenance of the cap. The fence would require long-term maintenance, and violation by tresspassers could reduce protectiveness. The groundwater treatment system would reduce contaminant levels, but requires maintenance for the duration of its operating life. The monitoring program management would assure effectiveness of the groundwater treatment system.

Alternative D would remove only exposed tars, leaving contaminated fill in place, thereby reducing long-term effectiveness. The deed restriction would protect against disturbance of the fill, including establishment of drinking water wells in the vicinity of the fill area, for as long as the restriction is in effect. Continuous professional management of the monitoring program would be required as described above under Alternative B.

Alternative E would remove all contaminated fill material and dispose of it in an off-site secure landfill. Long-term effectiveness and permanence on-site would be maximized but long-term maintenance of tars landfilled off-site would require monitoring and possible future remediation of that facility. The groundwater treatment system would reduce contaminant levels, but requires maintenance for the duration of its operating life. The monitoring program management would assure effectiveness of the groundwater treatment system. Since the contamination source is completely removed, it is expected that groundwater contaminant levels would decrease and require a shorter period of treatment than Alternative C.

Alternative F would remove and incinerate all contaminated fill material. Long-term effectiveness and permanence is maximized by treating the source of contamination in this manner. The groundwater treatment component of this alternative would reduce contaminant levels but requires maintenance for the duration of its operating life. The monitoring program management would assure effectiveness of the groundwater treatment system. As in Alternative E, groundwater contaminant levels are expected to decrease and require a shorter period for treatment.

Alternative G would remove and incinerate the tars while the remaining fill material will be off-site disposed at a secure landfill. Long-term effectiveness and permanence on-site is maximized by treating the source of contamination in this manner but long-term maintenance of contaminated filllandfilled off-site would require monitoring and possible future remediation of that facility.. The deed restriction component of this alternative would prevent installation of drinking water wells within the area of known groundwater contamination. Since the source of contamination is completely removed, it is expected that groundwater contaminant levels will decrease through both biodegradation and natural attenuation. The monitoring program management would assure timely responses if action should be required.

Alternative H would remove both exposed tars and concentrated buried tars, while contaminated fill would undergo enhanced biological treatment, thereby maximizing long-term effectiveness. The deed restriction would protect against disturbance of the fill during the biological treatment process, and prevent the establishment of drinking water wells in the vicinity of the fill area, for as long as the restriction is in effect. Since the concentrated source of contamination is removed, and residually contaminated fill material is biologically treated to health based standards, it is expected that groundwater contaminant levels which are already below levels of concern will further decrease through both biodegradation and natural attenuation. The monitoring program management would assure timely responses if action should be required.

Alternatives F, G and H provide the greatest long-term effectiveness and permanence of remedy.

6) Implementability.

Alternative A, No Action, is easily implemented because no action is required.

The methods of disposal for Alternative B requires application of available construction equipment and proven technologies. The alternative is easily constructed and the materials necessary for completion are readily available in the Marquette area. Lack of incinerator capacity is the only limitation to implementability. Deed restrictions are feasible since the City of Marquette owns the study area land and it is zoned for recreational purposes.

The monitoring program required for Alternatives B, C, D, E, F, G and H is easily implemented.

The off-site disposal or incineration required for alternatives B, D, E, F, G and H are not subject to the land disposal restrictions under RCRA-HSWA and are therefore easily impleemented.

The materials and technology pertinent to the capping component of Alternative C are readily available and easy to implement. The potential structural instability of the exposed tars, which are highly viscous and exhibit only minor resistance to shear stress when exposed to temperatures above 15°C, could pose a problem. Some type of reinforcement will be necessary to properly install and stabilize the cap. Installation of the groundwater collection system would necessitate a large amount of excavation work and construction activity. The treatment system may also involve extensive pumping and treatment of large amounts of groundwater while realizing marginal reductions in contaminant concentrations because contaminated fill remains on-site.

The disposal of the tars in an off-site landfill, in Alternative D, is easily implemented from a construction standpoint. Deed restrictions are feasible since the City of Marquette owns the study area land and it is zoned for recreational purposes.

Alternative E involves disposal of all contaminated fill materials in an off-site landfill. Implementation is easy, from a construction standpoint. Implementation issues regarding the groundwater treatment system are similar to those discussed under Alternative C, except that contaminated fill materials are removed and groundwater treatment timeframes are reduced accordingly.

Disposal methods for Alternative F, off-site incineration, is easily implemented from a construction standpoint. However, since a larger volume of material would be excavated for disposal, the availability of incinerator capacity may be more restrictive than Alternative B. Implementation issues regarding the groundwater treatment system is discussed under Alternative E.

Alternative G involves the same implementability issues as described under Alternative B for incineration, and Alternative E for groundwater treatment, otherwise it is easily implementable.

The excavation, segregation and disposal methods for Alternative H are easily implemented from a construction standpoint. The biological treatment of the contaminated fill material is easily implementable from a materials and construction standpoint. Extensive coordination between the Agencies are required during the actual remedial design pilot studies to optimize the performance of the chosen enhanced biological treatment option. The cap will not require extensive maintenance as in Alternative C since the remaining fill material will meet health based standards at completion of the enhanced biological treatment. The deed restrictions are easily implementable since the City of Marquette own the property.

7) **Cost.**

The cost estimates presented for each alternative were developed from the 1988 Mean Cost Data guides and unit prices from similar remediation projects. Operation and maintenance costs were estimated for a thirty year period. A discount rate of 10% percent over a thirty year period was used for present worth calculations of capital and operating costs. The estimates provide a cost range of -30 to +50 percent of overall implementation costs. See Table 11 for the Alternatives Cost Summary.

Of the three alternatives, F, G and H, which best meet the six criteria above, Alternative H is the least expensive. The levels of contamination in the fill material, although justifying treatment or isolation based upon a direct contact risk, do not warrant the added cost of incineration or off-site disposal when compared to the alternative incorporating enhanced biological treatment of the fill material.

8) **State Acceptance.**

The State of Michigan has indicated that it concurs with the chosen remedial alternative. A letter from the Michigan Department of Natural Resources indicates this support (see Attachment 1).

9) Community Acceptance.

In general, based on public comment received, the community is most concerned about a proper balance between protection of human health and the environment and the cost of the remedial action. Some commenters do not believe that the residual fill material warrants additional excavation, treatment and off-site disposal as U.S. EPA's Proposed Plan preferred alternative. It is important to note that the majority of these types of comments are from the "regulated" community and not the general public. U.S. EPA believes that Alternative H best achieves cost-effective protection of human health and the environment, yet still addresses the concerns of the public, MDNR and the U.S. EPA.

The specific comments received and U.S. EPA's responses are outlined in the Attached Responsiveness Summary.

X. THE SELECTED REMEDY

U.S. EPA believes that the proposed remedy, Alternative H, is the most appropriate solution for the site because of its performance against the nine evaluation criteria previously discussed. The major components of Alternative H include the following:

* Excavation and treatment, via incineration, of approximately 200 cubic yards of exposed tar.

* Excavation, segregation and treatment, via incineration, of approximately 200 cubic yards of buried tar.

* Excavation and treatment, via enhanced biological treatment, of approximately 9,200 cubic yards of residual contaminated fill material.

* Topsoil cover and revegetation of bioremediated fill area.

* Site deed restrictions that prevent installation of drinking water wells within the vicinity of the contaminated groundwater boundaries and disturbance of fill material until health based remedial action goals have been achieved.

* Groundwater/air monitoring program to confirm the adequacy of enhanced biological treatment of residual contaminated fill material and in-situ bioremediation of residual groundwater contamination.

XI. STATUTORY DETERMINATIONS SUMMARY

1. Protection of Human Health and the Environment

The selected remedy provides a sufficient degree of overall protection of human health and the environment, by treating all contaminated fill materials by either incineration or enhanced biological treatment, and eliminating further groundwater contamination. Institutional controls will be implemented during remediation to assure protection until confirmation sampling and analyses indicate that a health based clean-up has been achieved.

Any short term risks associated with excavation of contaminated materials (dust generation) will be minimized by the use of good construction practices. Air monitoring will be conducted to assess possible exposure during remedial action.

2. Attainment of ARARs

The selected remedy will attain all Federal and State applicable or relevant and appropriate requirements as described in Section IX of this Record of Decision. In addition, the selected remedy will attain all Federal and State "To Be Considered" requirements as described in Section IX of this Record of Decision.

3. Cost-Effectiveness

The selected remedy provides overall cost-effectiveness because a high degree of permanence is achieved by treatment, via incineration, of concentrated tars, and enhanced biological treatment of residual contaminated fill and monitoring groundwater. The selected remedy can be implemented at a cost far less than the complete incineration of all fill material or partial incineration and complete off-site disposal of contaminated materials.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy provides the best balance with respect to the nine evaluation criteria as described in Section IX of this Record of Decision. Treatment technologies are utilized to the maximum extent practicable by incinerating tars found within the fill and biologically treating the residual contaminated fill to health based standards. This alternative is further balanced with respect to the nine criteria because a permanent solution which utilizes treatment technologies is being selected, but it is being applied to both those contaminants posing the greatest risk and the residual contaminated fill material. The groundwater monitoring component of the selected remedial action will assure that concentrations of contaminants do not increase after implementation of the source control remedial action.

5. Preference for treatment as a Principal Element

The selected remedy eliminates the principal threats at the site, direct contact with and/or ingestion of contaminated fill by the use of treatment, via incineration, of the tars and enhanced biological treatment of residual contaminated fill.

TABLE 4

MAXIMUM CONCENTRATION DETECTED COMPARED TO TOXICITY VALUES

Contaminant	Waste Tars ug/kg (wet weight)	Maximum Concentration Ground Water ug/l	Carcinogenic Classification U.S. EPA (a)	Reference Dose* Ingestion mg/kg/day	Carcinogenic Potency Factor Ingestion (mg/kg/day)
Benzene	600	4	A	NA	0.029
Ethylbenzene	83,000	20	NA	0.1	NA
Toluene	16,000	7	NA	0.3	NA
Xylenes	320,000	41	NA	2.0*	NA
Tetrachloroethene	400	LT 1	B2	0.01*	0.051 (b)
Phenol	891,000	270	NA	0.04	NA
2-Methylphenol	540,000	570	NA	0.5 (c)	NA
4-Methylphenol	802,000	240	NA	0.5 (c)	NA
2,4-Dimethylphenol	612,000	800	NA	NI	NA
Naphthalene	724,000	210	D	NI	ID
2-Methylnaphthalene	501,700	12	NC	ID	ID
Acenaphthene	13,600	—	D	ID	ID
Dibenzofuran	120,000	21	NC	ID	ID
Fluoranthene	1200	—	NC	ID	ID
Indeno(1,2,3)pyrene	193	--	C	NA	11.5 (d)
Dibenz(a)anthracene	102	—	B2	ID	11.5 (d)
Benzo(ghi)perylene	218	—	NC	ID	ID
Phenanthrene	112,000	LT 1	D	ID	ID
Pyrene	15,600	LT 1	D	ID	ID
Chrysene	11,700	—	B2	ID	11.5 (d)
Fluorene	4,200	LT 1	D	ID	ID
Benzo(a)anthracene	910	—	B2	ID	11.5 (d)
Anthracene	4160	33	D	ID	ID

A = Human Carcinogen
B2 = Probable Human Carcinogen (Sufficient evidence in animals, inadequate evidence in humans)
C = Possible human carcinogen (Limited evidence in animals, no data in humans)
D = Not classifiable as to human carcinogenicity (inadequate data in humans, inadequate data in animals)
NC = Not Classified
* = Toxicological Data from IRIS - USEPA (1988). Values in parentheses from other sources
(a) = Assigned by analogy to classified compound
(b) = USEPA (1987) OHEA Documentation of ADIs, q*s and associated data
NI = No data available in IRIS
(c) = Superfund Public Health Evaluation Manual
(d) U.S. EPA commonly uses the Carcinogenic Potency Factor of benzo(a)pyrene for Carcinogen Classes C and B2 for

NA = Not Applicable

ID = Insufficient Data

Table 5

CLIFFS DOW SITE
COMPARISON OF ESTIMATED DAILY INTAKE TO REFERENCE DOSE (RfD)
SOIL INGESTION EXPOSURE
SURFACE/SUBSURFACE TARS

Chemical	Reference Dose (RfD) mg/kg/day a	Maximum Concentration mg/kg	10 kg CHILD 0.2 gram of tar /day Estimated Daily Intake (EDI) mg/kg/day	EDI/RfD	Exceed Reference Dose	15 kg CHILD 0.2 gram of tar /day Estimated Daily Intake (EDI) mg/kg/day	EDI/RfD	Exceed Reference Dose	70 kg Adult 0.1 gram of tar /day Estimated Daily Intake (EDI) mg/kg/day	EDI/RfD	Exceed Reference Dose
Ethylbenzene	0.1000 I	83.0000	0.0017	0.0166	NO	[illegible]	[illegible]	NO	0.0001	0.0012	NO
Toluene	[illegible] I	16.0000	0.0003	0.0011	NO	[illegible]	[illegible]	NO	0.0000	0.0001	NO
Xylenes	2.0000 I	170.0000	0.0034	0.0017	NO	[illegible]	[illegible]	NO	[illegible]	0.0002	NO
Phenol	[illegible] I	890.0000	0.0178	[illegible]	NO	[illegible]	[illegible]	NO	0.0013	[illegible]	NO
2-Methylphenol	0.5000 S	540.0000	0.0108	0.0216	NO	[illegible]	[illegible]	NO	0.0008	0.0015	NO
4-Methylphenol	0.5000 S	872.0000	0.0174	[illegible]	NO	[illegible]	[illegible]	NO	[illegible]	0.0025	NO
Naphthalene	[illegible] H	776.0000	0.0155	[illegible]	NO	[illegible]	[illegible]	NO	[illegible]	0.0026	NO
Hazard Index (Sum of EDI/RfD)				[illegible]			[illegible]			0.0401	

EXPOSURE ASSUMPTIONS

	10 kg CHILD	15 kg CHILD	70 kg Adult
Exposure Setting	Residential	Residential	Residential
Exposed Individual			
Soil Intake (grams/day)	0.2000	[illegible]	0.1000
Body Weight (kilograms)	10.0000	15.0000	70.0000

a. Source:
I: IRIS - Integrated Risk Information System, U.S. EPA 1988.
S: SPHEM - Superfund Public Health Evaluation Manual, U.S. EPA 1986.
H: HEA/HEED - Quarterly Summary of HEA and HEED Chemicals, U.S. EPA 1988.
B: Cyanide value based on free cyanide.
C: Nickel value base on nickel soluble salts.

Table 6

EXCESS LIFETIME CANCER RISKS FOR ESTIMATED CHEMICAL INTAKES

Contaminant	Cancer Potency (mg/kg/day)	Highest Detected Concentration		Excess Cancer Risks for Estimate Intakes (a)	
		Tar (mg/kg)	Ground Water (mg/liter)	Tar (0.1 g/day)	Ground Water (2 liters/day)
Benzene	0.029(b)	0.660	0.004	2.8×10^{-8}	3.3×10^{-6}
Tetrachloroethene	0.051(c)	0.490	ND(0.001)	3.6×10^{-8}	--
Indeno(1,2,3)pyrene	11.5 (d)	0.158	—	2.6×10^{-6}	—
Dibenz(a)anthracene	11.5 (d)	0.102	—	1.7×10^{-6}	--
Chrysene	11.5 (d)	11.7	—	1.9×10^{-4}	—
Benzo(a)anthracene	11.5 (d)	0.93	—	1.5×10^{-5}	--
TOTAL				2.09×10^{-4}	3.3×10^{-6}

(a) = For a daily lifetime (70 year) exposure to a 70 kg body weight adult
(b) = U.S. EPA (1988) IRIS
(c) = U.S. EPA (1988) Potency factor for tetrachloroethene is being reevaluated by U.S. EPA (not listed in IRIS at present time)
(d) = Cancer potency factors for Class C and B2 have not been developed, but U.S. EPA assigns the Cancer Potency Factor of benzo(a)pyrene to the U.S. EPA class C and B2 carcinogens for risk assessments.

Table 7

CLIFFS DOW SITE
COMPARISON OF ESTIMATED DAILY INTAKE TO REFERENCE DOSE (RfD)
GROUNDWATER INGESTION EXPOSURE

ical	Reference Dose (RfD)[a] mg/kg/day	Maximum Concentration mg/l	10 kg CHILD Estimated Daily Intake (DI) mg/kg/day	DI/RfD	Exceed Reference Dose	35 kg CHILD Estimated Daily Intake (DI) mg/kg/day	DI/RfD	Exceed Reference Dose	70 kg ADULT Estimated Daily Intake (DI) mg/kg/day	DI/RfD	Exceed Reference Dose
hnzene	0.1 I	0.02	0.0020	0.010	NO	0.0016	0.016	NO	0.0016	0.016	NO
ne	0.3 I	0.017	0.0017	0.012	NO	0.0012	0.011	NO	0.0012	0.011	NO
us	2 I	0.011	0.0011	0.012	NO	0.0012	0.011	NO	0.0012	0.011	NO
d	0.01 I	0.22	0.0220	0.520	NO	0.0063	0.157	NO	0.0063	0.157	NO
hylphenol	0.5 S	0.57	0.0570	0.114	NO	0.0163	0.033	NO	0.0163	0.033	NO
hylphenol	0.5 S	0.25	0.0250	0.050	NO	0.0071	0.014	NO	0.0071	0.014	NO
halene	0.4 H	0.21	0.0210	0.052	NO	0.0060	0.015	NO	0.0060	0.015	NO
Index (Sum of DI/RfD)				0.791			0.256			0.256	

RE ASSUMPTIONS

	10 kg CHILD	35 kg CHILD	70 kg ADULT
re Setting	Residential	Residential	Residential
al Individual	Child	Child	Adult
Intake (liters/day)	1	1	2
eight (kilograms)	10	35	70

rce: I: IRIS - Integrated Risk Information System, U.S. EPA 1988.
S: SPHEM - Superfund Public Health Evaluation Manual, U.S.EPA 1986
H: HEAST - Quarterly Summary of HEA and HEED Chemicals. U.S. EPA 1988
B: Cyanide value based on free cyanide.
C: Nickel value based on nickel-soluble salts.

Table 8-1

ALTERNATIVE B Excavation and Off-Site Incineration of Tars, Deed Restriction, Soil Cover, and Monitoring Program.

Capital Costs		
Health and Safety Plan	$	20,000
Safety Provisions		40,000
Equipment Decontamination		50,000
Air Monitoring Equipment		53,700
Monitoring Wells		42,000
Site Clearing and Grubbing		7,140
Excavation of Tars (200 cubic yards)		9,710
Disposal by Incineration		80,000
Transportation (loading)		13,550
Restoration (fill and topsoil)		51,400
Deed Restriction		11,500
Subtotal		379,000
25% Contingencies		94,750
Estimated Construction Costs		473,750
25% Misc.,Engineering, Legal		118,438
Total Capital	$	592,188
Operation and Maintenance		
Groundwater Sampling / Analyses		13,700/yr. (a)
Air Sampling / Analyses / Pump Replacement		15,580/yr.
Maintenance		34,000/yr.
Total Operation and Maintenance	$	63,280/yr.
* Present Worth Operation and Maintenance (30 years at 10%)		596,540
* Total Present Worth Cost	$	1,188,728

(a) = Estimates are based upon 8 wells sampled/analyzed semi-annually.

Table 8-2

ALTERNATIVE C Impermeable Cap, Groundwater Treatment, Fencing, and Monitoring Program.

Capital Costs		
Health and Safety Plan	$ 20,000	
Safety Provisions	40,000	
Equipment Decontamination	50,000	
Air Monitoring Equipment	53,700	
Monitoring Wells	42,000	
Stabilizing Fabric	2,400	
Excavation and Transfer of Tars	6,770	(a)
Synthetic Liner	3,600	
Clay Cover	29,500	
Fencing	19,000	
Restoration	11,600	
Groundwater Collection and Treatment	503,000	(a)
Subtotal	781,570	
25% Contingencies	195,393	
Estimated Construction Costs	976,963	
25% Misc., Engineering, Legal	244,241	
Total Capital	$ 1,221,204	
Operation and Maintenance		
Groundwater Sampling / Analyses	$ 13,700/yr.	(a)
Air Sampling / Analyses / Pump Replacement	15,580/yr.	
Maintenance of Restored Area	7,000/yr.	
Groundwater Collection/Treatment	187,000/yr.	(b)
Total Operation and Maintenance	**$ 223,280/yr.**	
* Present Worth Operation and Maintenance (30 years at 10%)	$ 2,104,860	
* Total Present Worth Cost	$ 3,326,064	

(a) = Estimates are based upon 8 wells sampled/analyzed semi-annually.

(b) = Calculational errors discovered in the Feasibility Study have been corrected.

Table 8-3

ALTERNATIVE D Off-Site Landfill of All Tars, Deed Restriction, and Monitoring Program.

Capital Costs

Health and Safety Plan	$ 20,000	
Safety Provisions	40,000	
Equipment Decontamination	50,000	
Air Monitoring Equipment	53,700	
Monitoring Wells	42,000	
Site Clearing and Grubbing	7,140	(a)
Excavation of Tars (200 cubic yards)	9,710	
Off-Site Compliant Landfill Disposal	30,000	(b)
Transportation (loading)	41,920	(c)
Restoration	11,600	
Deed Restriction	11,500	
Subtotal	317,570	
25% Contingencies	77,393	
Estimated Construction Costs	396,963	
25% Misc.,Engineering, Legal	99,240	
Total Capital	$ 496,203	

Operation and Maintenance

Groundwater Sampling / Analyses	13,700/yr.	(d)
Air Sampling / Analyses / Pump Replacement	15,580/yr.	
Maintenance of Restored Areas	5,000/yr.	
Total Operation and Maintenance	$ 34,280/yr.	
* Present Worth Operation and Maintenance (30 years at 10%)	$ 323,157	
* Total Present Worth Cost	$ 792,360	

(a) = This component has been added to this alternative.
(b) = Corrections have made for waste disposal costs: $150/CY x 200 CY = $ 30,000
(c) = Corrections have been made to this component, transport distance is assumed to be 800 miles roundtrip.
(d) = Estimates are based upon 8 wells sampled/analyzed semi-annually.

Table 8-4

ALTERNATIVE E Off-Site Landfill of All Fill, Groundwater Treatment, and Monitoring Program.

Capital Costs

Health and Safety Plan	$ 20,000	
Safety Provisions	40,000	
Equipment Decontamination	50,000	
Air Monitoring Equipment	53,700	
Monitoring Wells	42,000	
Site Clearing and Grubbing	7,140	
Excavation/Loading of Fill (9,600 cubic yards)	215,900	(a)
Groundwater Collection / Treatment	503,000	(b)
Transportation	387,000	(c)
Off-Site Compliant Landfill Disposal	1,440,000	(d)
Restoration	279,400	
Subtotal	3,038,340	
25% Contingencies	759,585	
Estimated Construction Costs	3,797,925	
25% Misc.,Engineering, Legal	949,481	
Total Capital	$ 4,747,406	

Operation and Maintenance

Groundwater Sampling / Analyses	13,700/yr.	(e)
Air Sampling / Analyses / Pump Replacement	15,580/yr.	
Groundwater Collection and Treatment	187,500/yr.	(f)
Maintenance of Restored Areas	34,000/yr.	
Total Operation and Maintenance	**$ 250,280/yr.**	
* Present Worth Operation and Maintenance	$ 2,359,390	
* Total Present Worth Cost	$ 7,106,796	

(a) = Excavation and Loading components have been combined and calculational errors discovered in the Feasibility Study have been corrected.

(b) = Calculational errors discovered in the Feasibility Study have been corrected.

(c) = Corrections have been made to this component, transport distance is assumed to be 800 miles roundtrip.

(d) = Corrections have made for waste disposal costs: $150/CY x 9,600 CY = $ 1,440,000.

(e) = Estimates are based upon 8 wells sampled/analyzed semi-annually.

(f) = Calculational errors discovered in the Feasibility Study have been corrected.

Table 8-5

ALTERNATIVE F Off-Site Incineration of All Fill, Groundwater Treatment, and Monitoring Program.

Capital Costs

Health and Safety Plan	$	20,000	
Safety Provisions		40,000	
Equipment Decontamination		50,000	
Air Monitoring Equipment		53,700	
Monitoring Wells		42,000	
Site Clearing and Grubbing		7,140	
Excavation/Loading of Fill (9600 cubic yards)		215,900	(a)
Off-Site Disposal by Incineration		3,840,000	
Transportation		387,200	(b)
Restoration		297,400	
Groundwater Collection / Treatment		503,000	(c)
Subtotal		5,438,340	
25% Contingencies		1,359,585	
Estimated Construction Costs		6,797,925	
25% Misc., Engineering, Legal		1,699,481	
Total Capital	$	8,497,406	

Operation and Maintenance

Groundwater Sampling / Analyses		13,700	(c)
Air Sampling / Analyses / Pump Replacement		15,580	
Maintenance of Restored Areas		34,000	
Groundwater Collection / Treatment		187,000	(d)
Total Operation and Maintenance	$	250,280	
* Present Worth Operation and Maintenance (30 years at 10%)	$	2,359,390	
* Total Present Worth Cost	$	10,856,796	

(a) = Excavation and Loading components have been combined and calculational errors discovered in the Feasibility Study have been corrected.

(b) = Corrections have been made to this component, transport distance is assumed to be 800 miles roundtrip.

(c) = Estimates are based upon 8 wells sampled/analyzed semi-annually.

(d) = Calculational errors discovered in the Feasibility Study have been corrected.

Table 8-6

ALTERNATIVE G Off-Site Incineration of Tars, Off-Site Landfilling of Remaining Fill, Deed Restrictions, and Monitoring Program

Capital Costs

Health and Safety Plan	$ 20,000	
Safety Provisions	40,000	
Equipment Decontamination	50,000	
Air Monitoring Equipment	53,700	
Monitoring Wells	42,000	
Site Clearing and Grubbing	7,140	
Excavation/Loading of Tars and Fill (9,600 cubic yards)	215,900	(a)
Off-Site Disposal by Incineration (400 cubic yards)	160,000	(a)
Off-Site Compliant Landfill Disposal (9,200 cubic yards)	1,410,000	(b)
Transportation	387,200	(c)
Restoration	279,400	
Deed Restriction	11,500	
Subtotal	2,676,840	
25% Contingencies	669,210	
Estimated Construction Costs	3,346,050	
25% Misc.,Engineering, Legal	836,513	
Total Capital	$ 4,182,263	

Operation and Maintenance

Groundwater Sampling / Analyses	13,700/yr.	(d)
Air Sampling / Analyses / Pump Replacement	15,580/yr.	
Maintenance of Restored Area	34,000/yr.	
Total Operation and Maintenance	$ 63,280/yr.	
* Present Worth Operation and Maintenance	$ 596,540	
* Total Present Worth Cost	$ 4,778,803	

(a) = Calculations are based on assumptions presented in the Feasibility Study.

(b) = Corrections have made for waste disposal costs: $150/CY x 9,200 CY = $ 1,410,000.

(c) = Corrections have been made to this component, transport distance is assumed to be 800 miles roundtrip.

(d) = Estimates are based upon 8 wells sampled/analyzed semi-annually.

Table 8-7

ALTERNATIVE B Off-Site Incineration of Exposed and Buried Tars, Biological Treatment of Residual Contaminated Fill, Soil Cover and Revegetation of Fill Area, Deed Restriction and Monitoring Program

Capital Costs

Health and Safety Plan	$ 20,000	
Safety Provisions	40,000	
Equipment Decontamination	50,000	
Air Monitoring Equipment	53,700	
Monitoring Wells	42,000	
Site Clearing and Grubbing	12,500	
Excavation/Loading of Tars (400 cubic yards)	20,000	(a)
Transportation	28,000	(a)
Off-Site Disposal by Incineration (400 cubic yards)	160,000	(a)
Excavation of Fill Material (9200 cubic yards)	184,000	(a)
Forced Aeration Biological Treatment of Fill:		(b)
Treatment	518,000	
Liner	86,000	
Leachate Collection System	7,500	
Run-on/Run-off Control System	62,000	
Power Supply	14,000	
Confirmation Sampling/Analyses	3,000	
Replacement	94,000	
Restoration	31,000	
Deed Restriction	11,500	
Subtotal	1,437,200	
25% Contingencies	359,300	
Estimated Construction Costs	1,796,500	
25% Misc.,Engineering, Legal	449,125	
Total Capital	**$ 2,245,625**	

Operation and Maintenance

Groundwater Sampling / Analyses	13,700/yr.	(c)
Air Sampling / Analyses / Pump Replacement	15,580/yr.	
Maintenance of Restored Area	34,000/yr.	
Total Operation and Maintenance	**$ 63,280/yr.**	
*** Present Worth Operation and Maintenance**	**$ 596,540**	
*** Total Present Worth Cost**	**$ 2,842,165**	

Table 8-7, Continued

(a) = Calculations are based on assumptions presented in the Feasibility Study and Supplemental FS.

(b) = Forced aeration biological treatment costs are presented for estimates. The actual costs should remain within the -30 to +50% range of overall implementation costs. The actual biological treatment method selected will be based upon results of pilot testing conducted during the remedial design phase.

(c) = Estimates are based upon 8 wells sampled/analyzed semi-annually.

Table 9

CLIFFS-DOW SITE
MONITORING PROGRAM

	MEDIA		
	Groundwater (b)	Air (c)	Fill Material (f)
Approximate No. of Monitoring Points	8	4	To be determined in remedial design.
Monitoring Control Points (a)	1 Upgradient 7 Downgradient	1 Upgradient 3 Downgradient	To be determined in remedial design.
Sample Parameters (d)	• Year 1; U.S. EPA Target Compound List (TCL) Organics • Years 2-30; Indicator Compounds (e)	Michigan Act 348 Requirements	To be determined in remedial design.
Sampling Frequency	Semi-annually	Semi-annually	To be determined in remedial design.

(a) The actual well locations to be included in the groundwater monitoring program will be determined following a reevaluation of the area hydrogeology. These activities will be conducted as a component of the Remedial Design to identify the optimum well locations. New wells will be installed if the existing wells prove to be inadequate for monitoring.

(b) Should groundwater analysis indicate that the following guidelines are exceeded then an additional discrete sampling event shall be immediately undertaken on those wells which exceed the guidelines. If this additional analytical effort indicates guideline exceedances then a pump and treat groundwater remediation shall be required:

- Level of U.S. EPA TCL Organics or indicator compounds exceed their SDWA-current MCL at time of sampling; or
- Level(s) of carcinogenic indicator compounds exceed an additive 10^{-6} cancer risk for those compounds without MCLs; or

Sampling frequency shall be reevaluated, and monitoring requirements may be terminated when the following guidelines are met:

- Level of contamination by indicator compounds with SDWA-MCLs has decreased over four (4) successive sampling rounds; and
- Levels of contamination for indicator compounds have an additive health based Hazard Index (HI) less than one (1) over four (4) successive sampling rounds.

(c) Air sampling shall be discontinued after 4 successive sample rounds fail to indicate elevated levels of contaminants.

(d) Sample parameters shall be the U.S. EPA Contract Laboratory Program, Routine Analytical Service, Target Compound List (CLP, RAS, TCL) for year (1) one. Following an Agency evaluation of the analytical results for year (1), an Indicator Compound List will be determined based upon ARARs and TBCs health advisories. This Indicator Compound List will be analyzed for years 2 through 30, or until criteria presented under item (b) are met.

(e) Sample parameters for inclusion in the CERCLA mandated five-year review shall include the CLP, RAS, TCL for the first semi-annual sampling round, every fifth year. The analysis will provide data upon which U.S. EPA will re-assess contaminants which potentially pose health risks. The Indicator Compound List described under item (d) will be modified accordingly.

(f) Enhanced bioremediation of residually contaminated fill material is a viable option for contamination such as that found at the Cliffs-Dow Site. The sample locations, parameters and frequency will be established by the Agency, based upon results of bioremediation pilot testing, in remedial design. The remedial action goals for fill material will result in residual contamination which should fall within U.S. EPA's acceptable risk range of 10^{-4} to 10^{-7}, with a preferred point of departure of 10^{-6}, for potential carcinogens and have a cumulative health index less than (1) one for non-carcinogens. Additionally, it must be demonstrated, to the satisfaction of the Agency, that any residual contamination would not adversely impact groundwater quality such that thoses requirements under item (b) would be exceeded.

TABLE 10-1
CLIFFS-DOW DISPOSAL AREA
U.S. EPA ARARs

KEY
+ = Attained
- = Not Attained
0 = ARAR not applicable or relevant and appropriate for this alternative
C = Chemical-specific ARAR
A = Action/Design-specific ARAR

IDENTIFIED ARAR	ARAR TYPE	DESCRIPTION	ALTERNATIVES A	B	C	D	E	F	G	H	COMMENTS
EPA-Safe Drinking Water Act (SDWA), Maximum Contaminant Levels (MCLs)	C	Contaminants in potential drinking water aquifer must not exceed MCLs.	-	+	+	+	+	+	+	+	Benzene MCL is 5 ppb.
Clean Water Act (CWA) Sections 301(b)(1)(c) and 301(b)(2)	C	Requires provision of best available treatment technology and ensures compliance with water quality standards in the receiving surface water body.	0	0	+	0	+	+	0	0	Direct discharges are expected to be in compliance with CWA standards. Available to alternatives C, E and F.
Clean Air Act	C	Establishes maximum concentrations in airborne releases.	-	+	+	+	+	+	+	+	Alternatives B through H are designed to eliminate or minimize airborne releases of contaminants.
RCRA: 40 CFR Part 262	A	Classifies site as a generator of hazardous waste. Manifest and pre-treatment requirements are relevant and appropriate.	0	+	0	+	+	+	+	+	Apply to off-site treatment or disposal alternatives.
40 CFR Part 263	A	Transporter regulations. Relevant and appropriate to alternatives which include off-site incineration or disposal.	0	+	0	+	+	+	+	+	Apply to off-site treatment or disposal alternatives.
40 CFR Part 264.14	A	Fencing and posting requirements. Relevant and appropriate to alternatives A through D.	-	+	+	+	0	0	0	0	Applys to those alternatives in which contaminated fill remains on-site above health based standards.

TABLE 10-2
CLIFFS-DOW DISPOSAL AREA
U.S. EPA ARARs

KEY
+ = Attained
- = Not Attained
0 = ARAR not applicable or relevant and appropriate for this alternative
C = Chemical-specific ARAR
A = Action/Design-specific ARAR

	ARAR		ALTERNATIVES								
IDENTIFIED ARAR	TYPE	DESCRIPTION	A	B	C	D	E	F	G	H	COMMENTS
40 CFR Part 264.111	A	Basic closure performance standards. Relevant and appropriate to all alternatives.	-	-	-	-	+	+	+	+	Attained by alternatives E through H.
40 CFR Part 264.114	A	Disposal/decontamination requirements for construction related equipment. Relevant and appropriate to alternatives B through H.	0	+	+	+	+	+	+	+	Provided for in alternatives B through H.
40 CFR Part 264.116	A	Survey of disposal units. Relevant and appropriate to alternatives A through D.	-	+	+	+	0	0	0	0	Survey provided for each alternative, except no action, in which contaminated fill remains on-site above health based standards.
40 CFR Part 264.117(a)	A	Post closure care of 30 years. Relevant and appropriate to alternatives B through H.	0	+	+	+	+	+	+	+	Provided for in alternatives B through H.
40 CFR Part 264.117(b)	A	Continuance of site security. Relevant and appropriate to alternatives A-D, which leaves contaminated fill on-site above health based standards.	-	-	-	-	0	0	0	0	Alternatives E through H off-site dispose or treat on-site wastes to health based standards.

TABLE 10-3
CLIFFS-DOW DISPOSAL AREA
U.S. EPA ARARs

KEY

+ = Attained

- = Not Attained

0 = ARAR not applicable or relevant and appropriate for this alternative

C = Chemical-specific ARAR

A = Action/Design-specific ARAR

IDENTIFIED ARAR	ARAR TYPE	DESCRIPTION	ALTERNATIVES A	B	C	D	E	F	G	H	COMMENTS
40 CFR Part 264.310	A	RCRA compliant cover and cover maintenance requirements.	-	-	-	-	0	0	0	+	Provided as impermeable cap over exposed tars only in alternative C and as soil cover over treated fill in alternative H.
40 CFR Part 264	A	RCRA "Clean Closure". Relevant and appropriate to alternatives E, F, and G.	0	0	0	0	+	+	+	0	Provided via complete removal of contaminated material in alternatives E, F and G.
40 CFR Part 264	A	"Health Based Closure". Relevant and appropriate to alternatives E through H.	0	0	0	0	+	+	+	+	Provided via complete removal of contaminated material in alternatives E, F and G. Also provided for via removal and treatment to health based standards in alternative H.
40 CFR Part 264 Subpart F	A	General groundwater monitoring requirements for RCRA permitted.	-	+	+	+	+	+	+	+	Groundwater monitoring program provided for in alternatives B through H.
Alternate Concentration Limits (ACLs), 40 CFR Part 264 Subpart F, SARA Section 121(d)(2)(B)(ii)	C	RCRA groundwater monitoring requirements applied to the site.	0	0	0	0	0	0	0	0	ACL's are not a functional element of alternatives A through H.

TABLE 10-4
CLIFFS-DOW DISPOSAL AREA
U.S. EPA ARARs

KEY
+ = Attained
- = Not Attained
0 = ARAR not applicable or relevant and appropriate for this alternative
C = Chemical-specific ARAR
A = Action/Design-specific ARAR

IDENTIFIED ARAR	ARAR TYPE	DESCRIPTION	ALTERNATIVES A	B	C	D	E	F	G	H	COMMENTS
40 CFR Part 403	C	Provides pretreatment requirements for direct discharge to POTW.	0	0	+	0	+	+	0	0	No direct discharges to POTWs are proposed in the identified alternatives. Alternatives C, E and F incorporate treatment before discharge.
40 CFR Part 264, Subpart L	A	Requirements for waste piles.	0	0	0	0	0	0	0	0	Relevant and appropriate for Subpart L alternative H in which wastes are segregated, stockpiled and treated.
Hazardous and Solid Waste Amendments of 1984	C	Provides for land disposal restrictions for RCRA hazardous wastes.	0	0	0	0	0	0	0	0	Not applicable for alternatives involving off-site disposal, contaminants are not RCRA listed wastes or RCRA characteristic wastes.

TABLE 10-5
CLIFFS-DOW DISPOSAL AREA
U.S. EPA "To-be -considered"

KEY
+ = Attained
- = Not Attained
0 = TBC does not apply to these alternatives
C = Chemical-specific TBC
A = Action/Design-specific TBC

IDENTIFIED TBC	TBC TYPE	DESCRIPTION	ALTERNATIVES A	B	C	D	E	F	G	H	COMMENTS
U.S. EPA Integrated Risk Information System (IRIS)	C	Provides chemical specific health based information.	-	-	-	-	+	+	+	+	Direct contact threat eliminated and health based standards met with alternatives E through H.
U.S. EPA Superfund Public Health Evaluation Manual (SPHEM)	C	Provides chemical specific health based information.	-	-	-	-	+	+	+	+	Direct contact threat eliminated and health based standards met with alternatives E through H.
U.S. EPA Office of Groudwater Protection - Groundwater Classification Guidelines	L	Classifies surficial aquifer as a Class II aquifer (current or potential use aquifer).	-	+	+	+	+	+	+	+	Actual ARARs are SDWA MCLs (benzene MCL = 5ppb).
U.S. EPA Off-Site Policy	A	Materials sent off-site mandated to go to a CERCLA compliant RCRA facility.	0	+	0	+	+	+	+	+	Incorporated into those alternatives involving off-site incineration and/or landfilling.
Great Lakes Water Quality Agreement	L	Provisions to assess, estimate, and limit discharge of toxic materials into waters within the Great Lakes system.	0	+	+	+	+	+	+	+	Monitoring plans provide for early detection and response to potential off-site discharge of contaminants.

TABLE 10-6
CLIFFS-DOW DISPOSAL AREA
MDNR ARARs

KEY
+ = Attained
- = Not Attained
0 = ARAR not applicable or relevant and appropriate for this alternative
C = Chemical-specific ARAR
A = Action/Design-specific ARAR

IDENTIFIED ARAR	ARAR TYPE	DESCRIPTION	ALTERNATIVES A	B	C	D	E	F	G	H	COMMENTS
Act 245 of 1929	C	Surface water quality standards.	0	0	+	0	+	+	0	0	Discharfes to meet water quality standards.
Part 9 Rule 323	C	Register of critical materials presenting discharges from groundwater treatment systems.	0	0	+	0	+	+	0	0	List critical materials presenting discharges from groundwater treatment systems.
Rule 607	A	Requires a contingency plan and emergency procedures during site activities.	0	+	+	+	+	+	+	+	Provided for in alternatives B through H.
Act 348 of 1965	C	Requirements for air monitoring.	-	+	+	+	+	+	+	+	Provided for in monitoring component of alternatives B through H.
Act 348 of 1965 Rules 371-373	A	Provisions of fugitive dust control program.	-	+	0	+	+	+	+	+	Provided for in those alternatives involving excavation of wastes.

TABLE 10-7
CLIFFS-DOW DISPOSAL AREA
MDNR "To-be-considered"

KEY
+ = Attained
- = Not Attained
0 = Does not apply to these alternatives
C = Chemical-specific TBC
A = Action/Design-specific TBC

	TBC		ALTERNATIVES								
IDENTIFIED TBC	TYPE	DESCRIPTION	A	B	C	D	E	F	G	H	COMMENTS
Act 64 of 1979:											
Part 2	A	Identification requirements for hazardous wastes.	0	+	0	+	+	+	+	+	For off-site disposal actions.
Part 3	A	Reporting, transport and storage requirements for hazardous wastes.	0	+	0	+	+	+	+	+	Alternatives have been developed to comply with hazardous waste
Part 4	A	Requires licensed hazardous waste hauler to facilitate transport of site materials.	0	+	0	+	+	+	+	+	Included in all excavation and and transport alternatives.
Rule 504	A	Requirements for construction permits for new hazardous waste treatment, storage and disposal facilities.	0	0	0	0	0	0	0	0	CERCLA sites are exempted from permitting requirements for on-site remedial actions.
Rule 506	A	Specifies technical information for hydrogeologic reports.	0	0	0	0	0	0	0	0	Does not apply to CERCLA sites.
Rule 508	A	Specifies operating license application contents for landfills.	0	0	0	0	0	0	0	0	No landfills are proposed in any of the alternatives.
Rule 602	A	General environmental and human health standards.	-	+	+	+	+	+	+	+	Achieved by these alternatives.

TABLE 10-8

CLIFFS-DOW DISPOSAL AREA

MDNR "To-be-considered"

KEY
+ = Attained
- = Not Attained
0 = Does not apply to these alternatives
C = Chemical-specific TBC
A = Action/Design-specific TBC

IDENTIFIED TBC	TBC TYPE	DESCRIPTION	ALTERNATIVES A	B	C	D	E	F	G	H	COMMENTS
Act 98 of 1913	A	Provides for supervision and control of sewerage systems.	0	0	0	0	0	0	0	0	No additions and or modifications to sewerage systems are proposed.
Act 245 of 1929: Rule 323, Part 21	A	Establishes the waste or waste effluent discharge permit system.	0	0	0	0	0	0	0	0	CERCLA sites are exempted from permitting requirements for on-site remedial actions.
Rule 323, Part 22	A	Provides groundwater quality rules, including nondegradation of usable aquifers.	-	+	+	+	+	+	+	+	Groundwater monitoring/action guidelines provided for in alternatives B through H.
Act 315 of 1969	A	Requirements for test wells.	-	+	+	+	+	+	+	+	Provided for in monitoring component of alternatives A through H.
Act 346 of 1972	A	Requires permit for constructing surface water discharge piping.	0	0	0	0	0	0	0	0	CERCLA sites are exempted from permitting requirements for on-site remedial actions.
Act 347 of 1972:											
Rule 1702	A	Soil erosion control and sediment plan for earth changes greater than one (1) acre.	0	0	0	0	+	+	+	+	Provided for in "clean" closure type alternatives.

TABLE 10-9
CLIFFS-DOW DISPOSAL AREA
MDNR "To-be-considered"

KEY
+ = Attained
- = Not Attained
0 = Does not apply to these alternatives
C = Chemical-specific TBC
A = Action/Design-specific TBC

IDENTIFIED TBC	TBC TYPE	DESCRIPTION	ALTERNATIVES A	B	C	D	E	F	G	H	COMMENTS
Act 347 of 1972:											
Rule 1704	A	Soil erosion control and sediment plan for earth changes within five hundred (500) feet of a lake or stream.	0	0	0	0	0	0	0	0	Site does not lie within five hundred (500) feet of a lake or stream.
Act 348 of 1965	A	Permitting requirements for air discharges occurring during remedial operations.	0	0	0	0	0	0	0	0	CERCLA sites are exempted from permitting requirements for on-site remedial actions.
Act 368 of 1978	A	Provides Michigan Department of of Public Health with the authority to protect the public health.	-	+	+	+	+	+	+	+	Alternatives B through H structured in accordance with Michigan Department of Public Health codes.

TABLE 11

Alternative A - No Action

Capital Cost	$	0
O and M		0
Present Worth O&M		0
Total Present Worth Cost		0

Alternative B - Excavation Off-Site Incineration of Tars, Deed Restriction, Soil Cover, and Monitoring Program

Capital Cost	$	592,188
O and M		63,280
Present Worth O&M		596,540
Total Present Worth Cost	$	1,188,728

Alternative C - Impermeable Cap, Groundwater Treatment, Fencing, Monitoring Program

Capital Cost	$	1,221,204
O and M		223,280
Present Worth O&M		2,104,860
Total Present Worth Cost	$	3,326,064

Alternative D - Off-Site Landfill of Tars, Deed Restriction, and Monitoring Program

Capital Cost	$	496,203
O and M		34,280
Present Worth O&M		323,157
Total Present Worth Cost	$	792,360

Alternative E - Off-Site Landfill of All Fill, Groundwater Treatment and Monitoring Program

Capital Cost	$	4,747,406
O and M		250,280
Present Worth O&M		2,359,390
Total Present Worth Cost	$	7,106,796

TABLE 11 cont.

Alternative F - Off-Site Incineration of All Fill, Groundwater Treatment, and Monitoring Program

Capital Cost	$ 8,497,406
O and M	250,280
Present Worth O&M	2,359,390
Total Present Worth Cost	$ 10,856,796

Alternative G - Off-Site Incineration of Tars, Off-Site Landfilling of Remaining Fill, Deed Restriction and Monitoring Program

Capital Cost	$ 4,182,263
O and M	63,280
Present Worth O&M	596,540
Total Present Worth Cost	$ 4,778,803

Alternative H - Off-Site Incineration of Exposed and Buried Tars, Enhanced Biological Treatment of Residual Contaminated Fill, Soil Cover and Revegetation of Fill Area, Deed Restriction and Monitoring Program

Capital Cost	$ 2,245,625
O and M	63,280
Present Worth O&M	596,540
Total Present Worth Cost	$ 2,842,165

TABLE 12
CLIFFS-DOW DISPOSAL AREA
IDENTIFICATION AND SCREENING OF BIOLOGICAL TREATMENT PROCESS OPTIONS

General Response Action	Remedial Technology	Process Options	Description	Screening Comments
Treatment of Fill Material	Biological Treatment	Land Farming	Spreading and tilling of waste on land, moisture control, and addition of nutrients as necessary to enhance degradation by microorganisms.	Potentially applicable.
		Forced Aeration Biological Treatment	Bulking, mounding, and forced aeration of waste materials to enhance aerobic biodegradation.	Potentially applicable.
		Liquid/Solid Slurry Bioreactor	Mixing of waste material with water in reactor to form slurry; continual mixing of slurry to facilitate biodegradation in the biomass.	Potentially applicable.
		In Situ Biodegradation	Delivery of necessary nutrients, moisture, and oxygen to enhance in-place biodegradation of contaminants.	Not applicable for site conditions. Fill material in unsaturated zone; moisture content would be difficult to control.

TABLE 13
CLIFFS-DOW DISPOSAL AREA
EVALUATION OF BIOLOGICAL TREATMENT PROCESS OPTIONS

General Response Action	Remedial Technology	Process Options	Effectiveness	Implementability	Cost
Treatment of Fill Material	Biological Treatment	Land Farming	Effectiveness likely.	Implementable. Space limitations would require treatment of portions of fill material at a time.	Low capital, medium O & M.
		Forced Aeration Biological Treatment	Effectiveness likely.	Readily implementable.	Medium capital, medium O & M.
		Liquid/Solid Slurry Bioreactor	Effectiveness likely.	Implementable; high liquid/solid slurry ratio would require numerous batch treatments.	High capital, high O & M.

ATTACHMENT 1

STATE OF MICHIGAN

NATURAL RESOURCES COMMISSION
THOMAS J. ANDERSON
MARLENE J. FLUHARTY
GORDON E. GUYER
KERRY KAMMER
O. STEWART MYERS
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RAYMOND POUPORE

JAMES J. BLANCHARD, Governor
DEPARTMENT OF NATURAL RESOURCES
STEVENS T. MASON BUILDING
P.O. BOX 30028
LANSING, MI 48909

DAVID F. HALES, Director

September 22, 1989

Mr. Valdas Adamkus
Regional Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Adamkus:

I am pleased to inform you that the Michigan Department of Natural Resources (MDNR) concurs with the selected remedy outlined in the Record of Decision (ROD) for the Cliffs-Dow Superfund site. The ROD indicates that the U.S. Environmental Protection Agency (EPA) proposes to:

1. Excavate exposed and buried tars and incinerate them off-site.

2. Conduct enhanced biological treatment of the remaining fill material. The enhanced bioremediation of the residual fill material will be evaluated during the remedial design portion of the project. If, based upon these remedial design pilot studies, it is determined that the fill material cannot be treated to a non-hazardous classification via the enhanced biological treatment, then off-site disposal and/or other treatment technologies will be required.

3. Provide a soil cap and revegetate the fill material after completion of the biological treatment.

4. Provide deed restrictions that prevent installation of drinking water wells within the vicinity of the contaminated groundwater boundaries.

5. Conduct a groundwater monitoring program. This program will be designed to assess the effectiveness of in-situ bioremediation on the groundwater contamination. If the in-situ groundwater bioremediation is ineffective and analysis indicates that the groundwater quality has not been restored, implementation of a plan to purge and treat the contaminated groundwater will be required.

6 Re-evaluate the hydrogeology of the area. This requirement is necessitated by the fact that the hydrogeology at the site has been misinterpreted.

7. Conduct an air monitoring program. This program will help to confirm the adequacy of the treatment being performed and ensure the saftey of on-site workers, the public and the environment.

If you have any questions regarding the site, please contact Mr. Richard Taszreak, the MDNR Project Manager, at 517-373-8248.

Sincerely,

Delbert Rector

Delbert Rector
Deputy Director
517-373-7917

cc: Mr. Frank Rollins, Environmental Protection Agency
Dr. James Truchan, MDNR
Mr. William Bradford, MDNR
Mr. Peter Ollila, MDNR
Mr. Richard Taszreak, MDNR

CLIFFS-DOW DISPOSAL
MARQUETTE, MICHIGAN

****

RESPONSIVENESS SUMMARY

INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA), with the Michigan Department of Natural Resources (MDNR), entered into an 106 Administrative Consent Order with the Dow Chemical Company, the Cleveland Cliffs Iron Company, the Georgia-Pacific Corporation and the City of Marquette stipulating the undertaking of a Remedial Investigation and Feasibility Study (RI/FS) and pre-design regarding the Cliffs-Dow Disposal site located in Marquette, Michigan. The required RI/FS activities have been completed, information was collected on the nature and extent of contamination at the Cliffs-Dow Site (RI), and alternatives for appropriate remedial action at Cliffs-Dow were developed and evaluated (FS and Proposed Plan). Throughout this process, public meetings have been held near the site in which U.S. EPA and MDNR were available to discuss the RI/FS and exchange information with the public. At the conclusion of the FS, a Proposed Plan was finalized by U.S. EPA, in consultation with MDNR, which identified recommended alternatives for remedial action at the Cliffs-Dow site. U.S. EPA offered a 90 day public comment period on U.S. EPA's proposed Plan and FS from April 7, 1989 to July 5, 1989. At a public meeting on April 25, 1989, U.S. EPA presented its Proposed Plan for the Cliffs-Dow Disposal Site.

The purpose of this responsiveness summary is to document the comments received during the public comment period, and U.S. EPA's responses to the comments. All of the comments summarized in this document were considered prior to U.S. EPA's final decision embodied in the Record of Decision for the site.

The responsiveness summary is divided into the following sections:

I. Responsiveness Summary Overview. This section briefly outlines the proposed remedial alternatives as presented in the Proposed Plan, including the recommended alternative.

II. Background on Community Involvement. This section provides a brief history of community interest and of concerns raised during planning activities at the site.

III. Summary of Public Comments Received During the Public Comment Period and U.S. EPA Responses. Both oral and written comments are grouped by issues, followed by U.S. EPA responses to these comments.

I. RESPONSIVENESS SUMMARY OVERVIEW

On April 7, 1989, U.S. EPA made available to the public for review and comment the Feasibility Study (FS) report dated July 1988 and U.S. EPA's

Proposed Plan for the Cliffs-Dow Disposal Site. The alternatives for remedial action described methods for cleaning up the tars, fill material, and groundwater at the site. U.S. EPA's Proposed Plan described in detail seven (7) alternatives for remedial action at the site. The proposed remedial alternatives included the following:

Alternative A - (Alternative 1 in the FS) - No Action- in which no further work will be done at the site.

Alternative B - (Alternative 7 in the FS) - Excavation and thermal destruction of the exposed tars in an off-site incinerator; soil cover over the remaining fill materials; deed restriction; and a groundwater and air monitoring program.

Alternative C - (Alternative 8 in the FS) - Impermeable cap over the area of the exposed tar materials; groundwater treatment system; fencing; and a groundwater and air monitoring program.

Alternative D - (Alternative 6 in the FS) - Excavation and off-site landfilling of the exposed tars; deed restrictions; and a groundwater and air monitoring program.

Alternative E - (Alternative 11 in the FS) - Excavation and off-site landfilling of all fill materials; a groundwater treatment system; and a groundwater and air monitoring program.

Alternative F - (Alternative 12 in the FS) - Excavation and off-site incineration of all fill materials; a groundwater treatment system; and a groundwater and air monitoring program.

Alternative G - ("Hybrid" of Alternatives 7 and 11 in the FS) - Excavation and off-site incineration of tars and off-site landfilling of all remaining fill material; deed restrictions; and a groundwater and air monitoring program.

After careful evaluation of the RI and FS, the U.S. EPA preferred Alternative G, in the Proposed Plan, for the Cliffs-Dow Disposal Site.

Numerous parties submitted formal written comments during the public comment period. Those parties included:

1) Mr. William Blake
   President/General Manager
   Taconite Broadcasting Company, Inc. (Q107 WMQT fm radio)

2) Ms. Susan Holloway
   Student-Northern Michigan University (NMU)

3) Mr. Gayle Coyer
   President-Upper Peninsula Environmental Coalition

4) Mr. D. J. Jacobetti, Chairman
House Appropriations Committee
State House of Representatives

5) Mr. Jerome A. Roth
Professor of Chemistry-NMU

6) Mr. James J. Scullion (Retired)
Pres. & Chief Exec. Officer
Lake Superior & Ishpeming R.R. Co.

7) Rev. Louis C. Cappo, Chairperson
Lake Superior Jobs Coalition

8) Mr. Dave Hamari, Marquette Citizen

9) Eugene E. Smary, Esq., on behalf of
City of Marquette, Michigan;
Georgia-Pacific Corporation;
The Dow Chemical Company: and
The Cleveland Cliffs Iron Company.

Numerous parties submitted verbal comments during the April 25, 1989, Proposed Plan public hearing. Those parties included:

1) Mr. Bill Witt, Environmental Manager
The Dow Chemical Company

2) Dr. Swiatoslav Kaczmar
O'Brien & Gere Engineers, Inc.

3) Mr. David Svanda, City Manager
City of Marquette

4) Mr. Buzz Berube, Mayor
City of Marquette

5) Mr. Dave Hamari, Marquette Citizen

6) Ms. Gail Coyer
President-Upper Peninsula Environmental Coalition

7) Mr. Richard Dunnebacke, Executive Director
Operation Action U.P.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

In the Spring of 1981, two people reported that they were walking through the disposal area and soiled their clothes with tar residue. The City of Marquette then began site investigations and placed the Cliffs-Dow Disposal Site on the U.S. EPA inventory list. The City of Marquette, the Dow

Chemical Company and the Michigan Department of Public Health initiated sampling activities at the Cliffs-Dow Disposal Site in 1981, which continued through 1982.

In September 1983, U.S. EPA placed the Cliffs-Dow Site on the Superfund National Priorities List (NPL).

U.S. EPA's planning process for the RI at the Cliffs-Dow Disposal Site began in the Winter, 1983, when the Dow Chemical Company and the Cleveland Cliffs Iron Company proposed to voluntarily work with U.S. EPA in resolving the problems at the Cliffs-Dow Site.

U.S. EPA prepared a Community Relations Plan (CRP) dated August 22, 1984, for the Cliffs-Dow Disposal Site. The CRP outlined a community relations strategy to apply to the Cliffs-Dow Site. In September 1984, public information repositories were established at the NMU campus and the City of Marquette Library.

On September 28, 1984, the U.S. EPA, with the MDNR, entered into an 106 Administrative Consent Order with certain potentially responsible parties (PRPs) that U.S. EPA has determined are liable for all costs of removal or remedial action at the site pursuant to Section 107 of CERCLA, including; the Dow Chemical Company, the Cleveland Cliffs Iron Company, the Georgia-Pacific Corporation and the City of Marquette, stipulating the undertaking of a Remedial Investigation and Feasibility Study (RI/FS) and pre-design regarding the Cliffs-Dow Disposal Site. The signed Order went out for public comment in October 1984. No comments were received during the thirty day comment period; the Order became effective thereafter.

On September 27, 1984, U.S. EPA held a public meeting to discuss RI/FS activities planned for the Cliffs-Dow Site and distribute a Fact Sheet regarding these activities. Interested parties included Marquette community leaders, the press, UPEC, the general public and the PRPs.

In November 1984 a fence with warning signs was installed, and the RI/FS field work began. Information was collected on the nature and extent of contamination at the Cliffs-Dow Site (RI). The RI report was completed in August 1987 and placed in the Peter White Public Library repository for public viewing in March 1988. Alternatives for appropriate remedial action at Cliffs-Dow were developed and evaluated (FS). The U.S. EPA prepared a Proposed Plan for remedial action for the Cliffs-Dow Site based upon the RI and FS Reports. The FS report and U.S. EPA's Proposed Plan were placed in the repository for public viewing on April 7, 1989.

On March 29, 1989, the PRPs filed a motion for a temporary restraining order and preliminary injunction in the U.S. District Court for the Western District of Michigan (Case No. M89-10087CA). The PRPs sought to restrain U.S. EPA from publishing the Proposed Plan, alleging that the Agency had violated the RI/FS Consent Order by selecting a remedy which the PRPs not studied in the FS. On April 3, 1989, Judge Hillman denied the motion, ruling that the PRPs had not demonstrated that they would be irreparably harmed by U.S. EPA's action or that they would likely succeed on the merits of their claims against the Agency at a future trial. Judge Hillman also found that the PRP's request was contrary to the public interest inasmuch as it would delay remedial action at the site. The case has since been dismissed without prejudice. For informational purposes, the U.S. EPA has included the Affidavit of Frank J. Rollins, Remedial Project Manager for the Cliffs-Dow Site, in the Administrative Record to the ROD.

On April 25, 1989, U.S. EPA held an availability session and a formal public hearing to discuss the FS and present its Proposed Plan for remedial action. Comments made by meeting attenders focused on the fact that the PRPs' preferred alternative differs from that of U.S. EPA and MDNR. Some commentors felt that U.S. EPA should negotiate degree of cleanup with the PRPs. Other community officials provided comments supporting the PRPs' preferred alternative. Specific responses to comments are presented in Section III of this Responsiveness Summary.

In addition to U.S. EPA's community relations efforts, the community has also participated in the following:

At the annual meeting of the Upper Peninsula Environmental Coalition (UPEC) held in April 1983 in Marquette, the MDNR included a presentation on the Cliffs-Dow Site; and

In March 1984, the students at NMU sponsored a public forum at which various environmental issues were discussed, including the Cliffs-Dow Site.

III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND U.S. EPA's RESPONSE TO COMMENTS.

Comments raised during the Cliffs-Dow Disposal Site Proposed Plan public comment period are summarized below. A number of comments were submitted during the public comment period which are not relevant to the selection of remedy and are not significant comments, criticisms, or new data regarding the Proposed Plan. Therefore, as per Section 117(b), it is not appropriate to respond to such comments in the Final Plan or Record of Decision (ROD). Such comments will, however, be included in the Administrative Record for the Cliffs-Dow Disposal Site.

The following general categories of comments were submitted during the public comment period:

1) Comments that the U.S. EPA preferred alternative is inappropriate because it provides too much protection, and
2) Comments from the PRPs proposing another alternative to address U.S. EPA remedy selection criteria.

Comments are organized and paraphrased in order to effectively summarize and respond to them in this document. The reader is referred to the actual reports and comments in the Administrative Record.

I. COMMENTS FROM THE PRPs. General.

The PRPs submitted multiple volumes of information as their public comment. Volume I; Joint Comments of The City of Marquette, Michigan; Georgia-Pacific Corporation; The Dow Chemical Company; and The Cleveland-Cliffs Iron Company (PRPs) on U.S. EPA's Proposed Plan; contained the substantive portion of their comments. In addition to actual comments on the U.S. EPA Proposed Plan, this document presents historic information, additional studies and an assemblage of reference information much of which do not regard the Proposed Plan itself and are not otherwise significant comments, criticisms or new data, and thus do not require responses under Section 117(b) of CERCLA.

As explained in the Executive Summary in Volume I of the PRPs comments, during the public comment period the PRPs conducted an extensive sampling and treatability study, and presented the results of their additional work as part of their public comment. The PRPs also prepared a supplemental FS, which unlike the July 1988 FS, was prepared according to Agency Guidance and addressed Agency concerns regarding contaminated fill materials. The activities that the PRPs conducted during the public comment period was beyond the requirements of the Consent Order. As such, the U.S. EPA had no authority to suggest or direct any additional work during the comment period.

I.A. Comment. (Volume I, pages 15-18).

The U.S. EPA Proposed Plan overestimates carcinogenic risks related to exposure of the fill material. The assumption that a human child or even an adult would repeatedly visit the site on a daily basis, every day of his/her 70-year life and ingest 100 mg. of fill material containing the highest measured concentrations of carcinogenic material is a gross overestimation and is inconsistent with human behavior, and what is known regarding the site, the land use area, and the bioavailability of PAHs in carbon rich soils. The potential is further reduced because the PRP proposed alternative, in the July 1988 FS, would incinerate exposed tars, provide for deed restrictions and a soil cover over the fill material.

The U.S. EPA assumption that polynuclear aromatic hydrocarbons (PAHs) with carcinogenic classifications of "B2" and "C" are human carcinogens, with the same cancer potency as benzo(a)pyrene (BaP), has no valid scientific justification.

I.A. Response.

During the course of an RI/FS at any Superfund site the U.S. EPA either prepares or has PRPs prepare a risk assessment according to U.S. EPA policy and guidelines. This risk assessment provides U.S. EPA with a basis for selection of remedy which would be protective of public health, welfare and the environment. The U.S. EPA utilizes the best available information and makes certain reasonable assumptions in risk calculations. The risk assessment presented in the Cliffs-Dow Proposed Plan was prepared consistent with U.S. EPA policy and guidance, and with risk assessments at other Superfund Sites.

The U.S. EPA commonly uses a "residential scenario" (i.e. unrestricted use of the site) when quantifying risks. Although the site is not currently zoned residential, there are no assurances that zoning ordinances may not change in the future. If such a zoning change occurs, a soil cover would likely be disturbed during any construction activities. The site is currently zoned recreational, as such, the public is allowed access.

The preamble to the proposed National Contingency Plan (NCP), 53 Fed. Reg. at 51423, states that: " ... institutional controls such as water and deed restrictions may supplement engineering controls for short- and long-term management to prevent, or limit exposure, to hazardous substances, pollutants, or contaminants. Institutional controls will be used routinely to prevent exposure to releases during the conduct of the remedial investigation and feasibility study, during remedial action implementation, and as a supplement to engineering controls designed to manage waste over time. The use of institutional controls to restrict use or access should not, however, substitute for active response measures (treatment and/or containment of source material, restoration of groundwater to their beneficial uses) as the sole remedy unless such active measures are determined not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of remedy. (Emphasis added).

U.S. EPA Directive 9850.4, "Interim Final Guidance for Soil Ingestion Rates", recommends that a soil ingestion rates of 0.2 grams (200 mg) per day for children and 0.1 grams (100mg) per day for adults be used in risk assessment calculations. This guidance does not take into consideration children who exhibit abnormal mouthing behavior. The standard adult weight for risk assessment calculations is 70 kg. The use of maximum contaminant concentrations detected is common when evaluating a "residential scenario" with both carcinogenic and non-carcinogenic contaminants similar to those at the Cliffs-Dow Site. The contaminants were detected both at the surface and at depth within the fill material. The detections were not single events, as shown in the RI and the PRPs' supplemental investigations. Additionally, there is no scientific evidence which would refute the potential for synergistic (additive) effects of multiple carcinogenic compounds found at the site.

For years, the scientific community has been conducting specific studies on a variety of PAH compounds and conclusions regarding their actual carcinogenicity are extremely variable. The actual health risks associated with PAH exposure is uncertain. The Office of Health and Environmental Assessment (OHEA) within the U.S. EPA's Office of Research and Development (ORD) has developed guidelines for carcinogen risk assessment. These guidelines discuss weighing the evidence that a substance is a carcinogen and classifying the chemical into one of five groups:

Group A - Human carcinogen
Group B - Probable human carcinogen
Group C - Possible human carcinogen
Group D - Not classified as to human carcinogenicity
Group E - Evidence of noncarcinogenicity for humans

For the PAH group of compounds the cancer potency factor for BaP is used for quantitative risk estimations, and applied to those compounds which are actual or possible human carcinogens (i.e. Groups A, B and C). It should be noted that there are uncertainties associated with the estimates of risks and the assumptions made in developing those estimations tend to be conservative, i.e., with a tendency towards overestimation. The actual risks are not likely to exceed those calculated; but may be lower. This method of risk calculation for PAH, applying the cancer potency factor of BaP to group A,B, and C carcinogens, provides for optimal protection of human health.

The U.S. EPA risk calculations presented in the Proposed Plan complied with Agency policy and guidance on risk assessment and resolve any ambiguities in favor of protecting human health and the environment.

I.B. Comment. (Volume I, page 27).

The PRPs state that "Section 121 of CERCLA compels selection of an alternative utilizing bioremedial treatment over an alternative utilizing off-site landfilling of the same material".

I.B. Response.

Section 121(b)(1) of CERCLA states that: "Remedial actions in which treatment permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants, is a principal element are to be preferred over remedial actions not involving treatment. The off-site transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. (Emphasis added).

As shown above, Section 121(b) states a preference, and not a requirement for selection of an alternative utilizing treatment. Section 121 also provides other criteria for selecting a remedy, including cost-effectiveness and consistency with the NCP, in turn provides nine selection criteria which are evaluated in the Proposed Plan and ROD. In the case of Cliffs-Dow, the U.S. EPA conducted a review of the alternatives presented in the FS which included a treatment component in the remedy. Many of these alternatives were carried forth and analyzed in the Proposed Plan. The treatment components presented in the FS utilized incineration to significantly and permanently reduce toxicity, mobility, and volume of waste. The FS and Proposed Plan evaluated a complete incineration of all wastes at the site and U.S. EPA determined that it was not cost-effective to utilize that method of treatment for the entire waste volume. The U.S. EPA preferred alternative included treatment by incineration as a integral component addressing the most concentrated wastes which would present a greater public health or environmental threat.

The U.S. EPA evaluated the enhanced biological treatment alternative which the PRPs presented as part of public comment. This alternative was balanced against the other alternatives previously presented in the Proposed Plan, and the enhanced biological treatment component of this alternative was incorporated into the U.S. EPA selected alternative. See the ROD for a complete nine NCP criteria evaluation of alternatives.

I.C. Comment. (Volume I, page 28).

The U.S. EPA has selected bioremediation at numerous other sites including: Iron Horse Park Site, Massachusetts; L.A. Clarke Site, Virginia; Renora, Inc. Site, Bonhamtown, New Jersey; Brown Wood Preserving Site, Live Oak, Florida; ATSF (Clovis) Site, New Mexico; Brio Refining Site, Texas; and French Limited Site, Texas.

I.C. Response.

The U.S. EPA acknowledges the selection of bioremediation at other Superfund sites as the major component of the selected remedy. The remedy selection process at a Superfund site is complex. This process requires careful site-specific data collection in the RI, and application of evaluation criteria to an array of alternatives which address site-specific conditions in a FS. Simple application of other remedies selected at other Superfund sites as grounds for selecting the remedy at the Cliffs-Dow site is not appropriate. The site-specific Administrative Record must be completely reviewed to determine the support documents for each Record of Decision (ROD). The following discussions highlight site-specific information which differentiates the Cliffs-Dow Site from those referenced in the Respondents' comments. Copies of these RODs have been included for reference in the Cliffs-Dow Administrative Record.

The Iron Horse Park Site, Massachusetts, is located in an industrial complex with a minimal potential for residential development. The ROD did not select a final remedy but a distinct operable unit to address specific lagoon sludge and contaminated soils. Contaminants found in the groundwater at the site are generally not related to the operable unit being addressed, but to other on-site sources which will be addressed in subsequent operable units. ROD at 10.

On-site incineration was evaluated as a remedial alternative but was not selected because it was significantly more expensive than bioremediation. ROD at 27. Off-site disposal was evaluated but a combination of treatment/off-site disposal was not.

The L.A. Clark Site, Virginia, is an active wood preserving operation which has been regulated under RCRA and has undergone state-mandated remedial action in addition to evaluations under Superfund. This ROD did not select a final remedy but will address known areas of soils and sediment contamination. The U.S. EPA will continue the RI/FS to investigate the extent of contamination of the shallow aquifer and sediments and develop alternatives for these pathways in a subsequent ROD. ROD at 12.

The clean-up of surface soils to 1x10e-6 risk for future residents ingestion scenario was a remedial action objective. A total carcinogenic PAH level of 0.08 mg/kg was determined to be acceptable for surface soils to meet this goal. To attain an interim 1x10e-5 risk at a groundwater receptor the groundwater cleanup would require a 10.3 mg/kg PAH and 94.03 ug/kg benzene in soils to meet these health based goals. A subsequent ROD will address appropriate groundwater cleanup. The alternatives evaluation did not discount off-site landfilling solely on the basis of CERCLA preference for waste treatment, the costs for off-site disposal were 300% greater than bioremediation and costs associated with incineration were nearly 400% greater than bioremediation. This extreme cost difference was due to the large volume of contaminated soils which required remediation. ROD at 35-38.

The Renora Inc. Site, Bonhamptown, New Jersey, is located in an area zoned for light industrial use. The site was contaminated due the transfer, storage and blending of waste oils on-site, and ultimate abandonment by the operator. A removal action was performed in October 1984, in which 33,000 gallons of liquid waste, 28,000 gallons of PCB contaminated waste oil and 1,060 cubic yards of contaminated soils were off-site disposed. The subsequent RI/FS was conducted to evaluate alternatives for residual site contamination.

The information gathered during the RI indicated that PAH contamination was limited to soils and there was no release of PAHs to the groundwater. The absence of groundwater contamination was controlled by limited vertical permeability due to the highly weathered, clay-rich bedrock at the site and the low hydraulic conductivity of the fill and alluvium.

The selected remedy for the Renora Site included the following components:

- Excavation and off-site landfilling of approximately 1100 cubic yards of PCB-contaminated soils above 5 ppm;
- Biodegradation of all PAH contaminated soils containing concentrations above 10 ppm;
- Use of groundwater as an irrigation medium for biodegradation; and
- Backfilling, grading and revegetation.

Target cleanup levels were selected which represented the New Jersey Department of Environmental Protection (NJEDEP) standards and anticipated performance capabilities of the technologies evaluated. The ROD qualifies remedy selection as follows: The potential for future remedial action would be determined based on the groundwater monitoring, annual site inspection and land use changes at or in the vicinity of the site. Changes in any of the aforementioned factors that increase the magnitude of risk to public health or the environment would require a re-assessment of the need for further remedial action. Based on the feasibility study, present worth costs of any further remedial action could range from $450,000 to $77,000,000 depending on the remedial action that would be implemented. Furthermore, the selection of bioremediation was qualified in that; a pre-design treatability study will be necessary to refine operating parameters for the system.

The Brown Wood Preserving Site, Live Oak, Florida, was a former wood preserving facility. From December 1987 through March 1988 a removal action was undertaken which included the excavation, stabilization and off-site disposal of 15,000 tons of creosote contaminated lagoon sludge. The ROD for the site embodies the remaining work necessary to complete the post-removal site remediation. The selected alternative "conditionally" accepts bioremediation as follows: if land treatment (biodegradation) does not attain the desired cleanup levels for the appropriate organic contaminants within the time allowed, then an alternative means of dealing with contaminated soils, such as removal, incineration, solidification, or vitrification, will be determined by U.S. EPA at that time. ROD at 29. The action levels set for carcinogenic PAHs, 100 ppm, was based on a Centers for Disease Control (CDC) evaluation PAH relative to 2,3,7,8 tetra-chlorodibenzo-p-dioxin. This approach is not common to U.S. EPA risk assessment calculations and was not applied at the Cliffs-Dow Site. The 1x10e-6 risk, and associated 100ppm action level was based upon infrequent trespass by children due to the rural locale and not based upon a residential scenario. See ROD Appendices.

ATSF (Clovis) Site, Clovis, New Mexico, is a drainage lake which was used for wastewater disposal from a railroad switching yard. The contamination found in lake sediments were predominantly hydrocarbons (up to 35 ppm), and total phenolics (about 1.1 ppm). These contaminants were not consistently detected in groundwater at the site. The bioremediation component of the remedy would address low level hydrocarbon contamination, with no set cleanup levels since there were no potential receptors identified.

Brio Refining Site, Texas, is a 58 acre site used for refining crude oil and styrene tars. Various waste products were disposed of and/or stored on-site. The ROD for the site indicated U.S. EPA's preference for incineration of 62,900 cubic yards of contaminated materials but would allow the potentially responsible parties (PRPs) an opportunity to perform treatability studies, to U.S. EPA's satisfaction, for biological treatment of these wastes. It is important to note that the major contaminants of concern at this site was volatile organic compounds (VOCs), with minor contamination by a few PAH compounds.

The FS for the site did evaluated both treatment and non-treatment alternatives addressing all contaminated material on-site. The estimated cost of treatment by incineration was $22,458,000 to $26,598,000. The estimated cost of treatment by bioremediation on-site was $23,308,000 to $23,333,000. The estimated cost of off-site disposal without treatment was $84,783,000. ROD at 20-21. In U.S. EPA's evaluation of alternatives there is a statutory preference for treatment. At this site the costs for off-site disposal without treatment are approximately 400% greater than on-site treatment. As such, preference would be toward the on-site treatment alternative.

French Limited Site, Texas, is a 22.5 acre site which was used for disposal of industrial wastes from area petrochemical companies. The U.S. EPA has conducted two removal actions at the site since 1982. Since the removals, the RI/FS has been completed. The ROD for the site evaluated several alternatives involving treatment via both incineration and/or combinations of incineration and biological treatment to address 149,600 cubic yards of contaminated sludge, sediment and soils. Cost ranges were from $47,000,000 for biological treatment to $166,800,000 for complete incineration of sludge and contaminated soils. The PRPs for this site preferred the biological treatment alternative as outlined in the FS and conducted a pilot study in order for the U.S. EPA to consider biological treatment as the remedy for the site. ROD at 11. Cleanup levels for this site was based upon a limited future use of the site and not a future residential scenario which resulted in higher action levels set at a 1x10e-5 cancer risk.

Conclusion: The U.S. EPA has selected remedial actions which incorporate bioremediation as a major component of the remedy at other sites. In many instances the bioremediation is put forth in the ROD as an alternative to a U.S. EPA proven technology such as incineration. When bioremediation is utilized, qualifiers are used so that if the bioremediation does not meet remedial goals, then other alternatives will be implemented. As explained above, the U.S. EPA has incorporated bioremediation into the final remedy.

I.D. Comment. (Volume I, page 37).

Prevention of direct contact with buried tars, a remedial objective first formally identified in the Proposed Plan, was not studied during the RI/FS process as a basis for evaluating remedial alternatives. This concern over contact with buried tars is critical to U.S. EPA's rejection of the PRP preferred alternative as presented in the FS dated July 1988.

The PRPs request that U.S. EPA identify the textual basis in the pre-April 1989 Administrative Record for its statement that residual tars have been a remedial objective to be evaluated. The PRPs believe the change is unexplained and without support in the Administrative Record or Proposed Plan.

I.D. Response.

As provided in the RI/FS Consent Order, the objective of the RI/FS is to identify and evaluate response actions for any threat to human health and the environment. The Agency has never established any other objectives for the site or limited the RI/FS to exposed tars. During the RI/FS various soil borings/samples were taken through both exposed tars and residual tars buried within the fill. The analyses of those samples indicated contamination both at the surface and at depth. The RI Report and Proposed Plan include tables and figures presenting analytical results and outlining sampling locations. The FS Report prepared by the PRPs presented a risk assessment which was not prepared in accordance with Agency guidance and did not incorporate Agency comment on previous drafts. The U.S. EPA corrected deficiencies and miscalculations in the PRP FS and presented an appropriate preferred alternative for remedial action in the Proposed Plan. The preferred alternative provided for protection of public health, welfare and the environment from both "exposed and or residual contaminants", which would meet the requirements of the NCP. See Administrative Record.

In addition, the proposed NCP states that "Final remediation goals will be determined when the remedy is selected. Remediation goals that establish acceptable exposure levels that are protective of human health and the environment shall be developed...". (Emphasis added). Proposed 40 C.F.R. 300.430(e)(2)(i), 53 Fed. Reg. 51474, 51505 (Dec. 21,1988).

I.E. Comment. (Volume I, pages 40-61).

The U.S. EPA improperly rejected Alternative B by misidentifying and misapplying Applicable or Relevant and Appropriate Requirements (ARARs) in accordance with U.S. EPA guidance.

The U.S. EPA and MDNR provided ARARs late in the RI/FS process. The ARARs provided merely a "laundry list" of potential ARARs.

The U.S. EPA misapplied certain Resource Conservation and Recovery Act (RCRA), Safe Drinking Water Act (SDWA), and State of Michigan ARARs.

I.E. Response.

The OSWER Directive 9234.1-01, (August 8, 1988) (Draft ARARs Guidance) provides a notice which states that "This draft guidance has not been formally released by the U.S. Environmental Protection Agency and should not at this stage be construed to represent Agency policy. It is subject to change and may be withdrawn without notice to holders." The ARARs guidance further states, at page xi, that "This manual will also be used by potentially responsible parties (PRPs) whenever they have the lead for identifying potential ARARs. In cases where potential ARARs are identified by the PRP, the actual ARARs will be decided by the lead agency." (emphasis added). The preamble to the proposed NCP states that "EPA in its oversight role for CERCLA enforcement actions, will resolve ARAR disputes between the lead agency and the potentially responsible parties" (emphasis added). 53 Fed. Reg. 51394, 51437 (Dec. 21, 1988). The U.S. EPA believes that it has properly analyzed and applied ARARs in the Proposed Plan.

Following submission of the Remedial Alternatives Analysis Technical Memorandum by the PRPs, the U.S. EPA transmitted a detailed ARARs package to the PRPs on January 20, 1988. The package outlined ARARs on an alternative-specific basis for inclusion in the FS. The reiteration and misapplication of ARARs, as they were presented in the FS were determined by U.S. EPA and presented appropriately in the Proposed Plan.

Specific comments were received regarding RCRA as an ARAR, specifically 40 C.F.R. Part 264. U.S. EPA has made the determination that the majority of the waste constituents found at the site are sufficiently similar to those hazardous waste constituents in which F001, K022 and K035 were listed (See

40 C.F.R. 261 Appendix VII) that many of the RCRA requirements under RCRA Part 264, although not applicable, are relevant and appropriate and that the application of these RCRA requirements would be protective of human health and the environment. An explanation of ARAR application is provided in the Proposed Plan. There were also some minor inconsistencies noted by the PRPs. Those which warranted corrections or needed further clarification are described as follows:

1) Proposed Plan, at page 17, indicates that "Alternatives B, C, and D would comply with...", 40 C.F.R. Subpart B Security requirements. The correct statement should read "Alternatives B, C and D would not comply...", this correction will be made in the ROD Table 10-1 is correct;
2) Proposed Plan, Table 10-1 indicating an alternatives ability to satisfy comparison to 40 C.F.R. 264.117(a) and (b) requirements are correct, since U.S. EPA had determined RCRA to be relevant and appropriate;
3) Proposed Plan, Table 10-3 indicating which alternatives satisfy 40 C.F.R. 264, Subpart F, groundwater monitoring requirements are correct. The Proposed Plan text refers to an alternatives ability to satisfy "Corrective action" requirements under 40 C.F.R 264;
4) Proposed Plan, Table 10-1 indicates that the SDWA ARAR was not met by alternatives B, C, and D. This is an error and will be corrected in the ROD to indicate that alternatives B, C, and D do satisfy this ARAR.
5) Proposed Plan, at 20 and Table 10-8, indicate that Michigan Department of Natural Resources, Water Resources Commission, Act 245, Part 22, Rule 233, is a to-be-considered (TBC) for the site. Both the Proposed Plan text and the Table 10-8 have incorrect citations of the Michigan Rule. The correct citation is: Act 245, Part 22, Rule 323. The corrections have been made, as appropriate, in the ROD. As set forth in the Proposed Plan the U.S. EPA maintains that this Michigan Rule is a TBC for the Cliffs-Dow Site and does require the degree of clean-up provided.
6) Other citations of Rule 233 made in the Proposed Plan have been corrected in the ROD to read "Rule 323", as appropriate.

I.F. Comment. (Volume I, pages 71-74).

The U.S. EPA presented an unrealistic overstatement of risk based upon the direct contact exposure route. The U.S. EPA had considered and relied upon certain information in the Agency for Toxic Substances and Disease Registry (ATSDR) Health Assessment for the Cliffs-Dow Site. The ATSDR Health Assessment (HA) document does not appear in the Administrative Record and is therefore a violation of CERCLA and the U.S. EPA Interim Guidance on Administrative Records for selection of CERCLA Response Actions, OSWER Directive No. 9355.0-26 (March 1, 1989). Should U.S. EPA decide to supplement the Administrative Record after the close of public comment by inclusion of the ATSDR document, it must reopen the public comment period.

I.F. Response.

See response to comment I.A. for general discussions on U.S. EPA risk calculations.

The ATSDR HA dated April 8, 1988, was reviewed by U.S. EPA and was not released to the public due to inaccuracies in identification of a exposure pathway resulting from the misidentification of dibenzofuran present at the site. Due to this inaccuracy within the document, the ATSDR HA for the Cliffs-Dow Site was not relied upon by the U.S. EPA in preparing the Proposed Plan. U.S. EPA had requested, but did not receive, revisions to the ATSDR HA prior to release of the Proposed Plan. The U.S. EPA had provided the PRPs a copy of the ATSDR HA in order to discuss and clarify the revisions which were needed in order to present factual information to the public.

The ATSDR has completed a draft amendment to the HA which corrects the original misinterpretation of data. The U.S. EPA has reviewed the draft amendment and determined that the Proposed Plan need not be modified because of it. Both the original ATSDR HA and the draft amendment have been included in the Administrative Record for informational purposes only.

The Administrative Record is comprised of all information, including public comments and additional information, used by the U.S. EPA Regional Administrator (RA) in making a selection of remedy for the site or other information which U.S. EPA believes is pertinent. The Administrative Record remains open until the ROD is signed by the RA. Neither CERCLA or the Administrative Record Guidance require reopening public comment period due to the inclusion of documents in the Administrative Record.

I.G. Comment. (Volume I, page 74).

The groundwater monitoring program guidelines referenced in U.S. EPA's Proposed Plan, Table 9, are inconsistent with the July 1988 FS, and are not supported by any technical justification. The U.S. EPA has arbitrarily increased the number of monitoring wells to eight, and has stated that the well locations will be determined "following a reevaluation of the area hydrogeology" without proving any basis for these statements. A monitoring well network has already been approved by U.S. EPA and MDNR during the RI. U.S. EPA cannot impose this groundwater monitoring "guideline" with no basis in the record.

I.G. Response.

During the RI, twenty-two (22) monitoring wells were installed to assess hydrogeologic conditions at the site. Results of this investigation indicated that the Cliffs-Dow Site is located in a highly complex geologic setting which is characterized by sands and gravels of variable hydraulic conductivity. The aquifer extends vertically to the local granitic bedrock. The bedrock surface is of high relief and geophysical data indicates that the depths to bedrock are extremely variable over short distances. The groundwater elevations and subsequent flow directions at the site are also variable due to the geology and seasonal water table fluctuations. The hydraulic characteristics of the bedrock underlying the sand and gravel water table aquifer were not evaluated in the RI.

The Proposed Plan, Table 9, presents a monitoring program which includes approximately eight monitoring wells to assess contaminant flow through the complex geologic system. The nature of groundwater flow at the site (multiple flow directions, varying water table elevations) would require that additional wells be sampled to assure that remedial action goals be met. The Proposed Plan provides for determination of optimum monitoring well locations and number of well during remedial design, after complete review of the existing monitoring well network. The "guidelines" further provide for replacement of monitoring wells if existing wells are inadequate. It is common for monitoring wells to lose their structural integrity over time, thereby compromising data quality and requiring the installation of new wells.

I.H. Comment. (Volume I, pages 75-77).

The guidelines for requiring an immediate pump and treat groundwater remedy upon a single exceedence of certain contaminant levels are unreasonable and arbitrary. A single exceedence may be the result of sampling or analytical technique, or unusual climatic or seasonal changes and does not represent a health or environmental risk justifying immediate mobilization of a groundwater treatment system. The PRPs have presented a monitoring program which would best meet the directives of CERCLA.

I.H. Response.

The U.S. EPA determined that the sand and gravel aquifer underlying the Cliffs-Dow Site is a Class II aquifer, consistent with U.S. EPA Office of Groundwater, Classification Guidelines. As such, the aquifer should be protected from contamination which would render the aquifer unusable or unacceptable as a source of drinking water. The Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs) and health based levels which meet a 1x10e-6 risk have been determined to be remedial action goals which would protect the aquifer and any potential groundwater receptors. The PRP proposed groundwater monitoring program and proposed subsequent remedial action would not adequately assess groundwater/contaminant flow and assure that these remedial goals would be attained.

The U.S. EPA agrees with the statement that a single exceedence of either an MCL, or a 1x10e-6 health based action level may be the result of sampling or analytical technique, or unusual climatic or seasonal changes and does not justify immediate mobilization of a groundwater treatment system. In response to this comment, the U.S. EPA has modified its' groundwater monitoring/action guidelines to indicate the procedure to be followed if an action level is exceeded in a single monitoring event. If an exceedance is noted, a discrete sampling event will be conducted at those well locations which indicate exceedences. If such subsequent sampling indicate action level exceedences then a pump and treat program shall be implemented. U.S. EPA believes that this additional sampling would alleviate PRP concerns regarding analytical variability yet still provides for adequate protection of groundwater.

The PRPs prepared a study which suggested that certain compounds detected in the groundwater were undergoing in-situ bioremediation. The U.S. EPA Proposed Plan preferred alternative would remove all contaminated materials from the site therefore only residual contamination would remain in the groundwater. Hence, the U.S. EPA incorporated in-situ bioremediation as its groundwater component of the remedy. The monitoring/action program would confirm that bioremediation was effective, with an immediate clean-up being required should remedial action goals not be met.

The recently proposed "enhanced" bioremediation of groundwater may provide for adequate groundwater cleanup but would require additional site investigations and an extensive pilot test program before acceptance by U.S. EPA. This program would not provide for groundwater clean-up in a timely manner should remedial action goals not be met.

I.I. Comment. (Volume I, pages 77-80).

The procedures U.S. EPA and MDNR followed in selecting the remedy was improper, unsupported and is contrary to law and policy and to the letter and spirit of the Consent Agreement.

I.I. Response.

The PRPs have complied with the terms of the Consent Agreement in conducting the necessary investigations and preparing the required reports. The U.S. EPA does not agree with all conclusions made in the reports and as such completed the Proposed Plan, consistent with CERCLA and the NCP, based upon information generated by the PRPs under the Consent Agreement. The U.S. EPA has received and evaluated comments from the PRPs and other members of the public, concerning the Proposed Plan, in making its final remedy decision.

The U.S. EPA's actions were consistent with Section 121(a) of CERCLA which states that "The President shall select appropriate remedial actions determined to be necessary to be carried out ...".

See narrative provided under I., Comments from the PRPs, General., for additional information.

I.J. Comment. (Volume I, page 80).

The U.S. EPA notes that soil borings taken at the site established that the fill consisted of "wood and charcoal scraps mixed with tars and soil with tar deposits in the surface depressions." This is an inaccurate statement. The U.S. EPA notes that "compounds consistently identified in the waste materials and considered to be potentially hazardous components are considered site indicator compounds."

I.J. Response.

The RI Report dated September 1989, presented analytical data for soil borings within the fill area, see Tables 1 through 4, which indicate that a majority of the site-indicator compounds were consistently detected in the borings at various elevations. Since these site-indicators are common to the tars deposited at the site, the statement that wood and charcoal scraps mixed with tars and soil with tar deposits in the surface depressions is an accurate statement.

The following was excerpted from the July 1988 FS, page 1-6, "The acid extractable and base neutral compounds were consistently detected in the soil and tar samples collected and analyzed during the waste characterization of the fill materials. The volatiles, however, were found only in some samples of the tar material. The chemical components in the set of compounds listed above were designated as "site-specific indicator parameters."" The U.S. EPA paraphrased these statements for inclusion in the Proposed Plan. Additionally, the indicator compounds selected are on U.S. EPA's Hazardous Substance List, therefore, this statement is correct.

I.K. Comment. (Volume I, page 80).

Table 1, at page 6, identified tetrachlorethane as a site indicator compound. This is an error. The compound is tetrachloroethylene.

I.K. Response.

U.S. EPA agrees with this comment and has made the appropriate correction.

I.L. Comment. (Volume I, pages 81-85).

On March 28, 1989, without notifying the PRPs, U.S. EPA issued a memorandum to the Administrative Record stating that the Cliffs-Dow Site may posed an imminent and substantial endangerment to the public health or welfare or the environment. The Administrative Record does not support the assertion of an imminent and substantial endangerment.

I.L. Response.

The Consent Order which is included in the Administrative Record contain the same findings as found in U.S. EPA's March 29, 1989, memorandum. The investigations conducted by the PRPs and U.S. EPA's Proposed Plan further support the findings contained within the memorandum. The site lies within a recreational area, with fishing, camping, hiking etc., being common. There are no substantive barriers which preclude trespassers or any restrictions which prevent the area from being rezoned for residential use in the future. There have been and continue to be, contaminant releases to the groundwater which approach drinking water MCLs. Ingestion of on-site soils, under a residential scenario, would result in carcinogenic risks above U.S. EPA's acceptable risk range.

Without implementation of a remedial action providing for an equivalent degree of protection as the preferred alternative in U.S. EPA s Proposed Plan, the site may continue to pose an imminent and substantial endangerment to public health or welfare or the environment.

The U.S. EPA has no obligation to notify the PRPs before placing a document in the Administrative Record.

I.M. Comment.

Included with the PRPs' comments were the following documents:

Appendix A: Groundwater Bioremediation Study
Appendix B: The Test Trench and Boring Investigation
Appendix C: The Bioremediation Treatability Study
Appendix D: Data Evaluation: New Risk Assessment and Uncertainty Calculations
Appendix E: The Supplemental Feasibility Study
Appendix F: May 1989 Monthly Report
Appendix G: Review of Health Assessment of the Cliffs-Dow Site
Appendix H: Groundwater Monitoring and Action Program
Appendix I: Amended Complaint, City of Marquette, et al. v. U.S. EPA et al.
Appendix J: March 21, 1989, Affidavit of William J. Witt, with Exhibits

I.M. Response.

Appendix A: The U.S. EPA has included this document in the Administrative Record as reference and has determined that no response is required.

Appendix B: The U.S. EPA has included this document in the Administrative Record as reference and has determined that no response is required.

Appendix C: The U.S. EPA, through the Applications and Assistance Branch of the Robert S. Kerr Environmental Research Laboratory (RSKRL) has provided review comments on the treatability study and has made certain recommendations. The RSKEL comments have been in the Administrative Record.

Appendix D: The U.S. EPA has included this document in the Administrative Record. U.S. EPA's reply to comments regarding the Cliffs-Dow Site risk assessment are included in U.S. EPA's response to comment I.A.

Appendix E: The U.S. EPA has included this document in the Administrative Record as reference and has determined that no response is required.

Appendix F: The U.S. EPA has included this document in the Administrative Record as reference and has determined that no response is required.

Appendix G: The U.S. EPA has included this document in the Administrative Record. The ATSDR has provided review comments and the amendment to the referenced ATSDR Health Assessment for the Cliffs-Dow Site. All ATSDR documents related to the Cliffs-Dow Site have been included in the Administrative Record. Additional U.S. EPA comments regarding the ATSDR Health Assessment are included in U.S. EPA's response to comment I.F.

Appendix H: The U.S. EPA has included this document in the Administrative Record. U.S. EPA's reply to this document are included in U.S. EPA's response to comment I.G. and I.H.

Appendix I and J: The U.S. EPA has included this document in the Administrative Record. U.S. EPA's reply to this document are included in U.S. EPA's response to Respondents' general comment I.

II. COMMENTS RECEIVED FROM THE PUBLIC DURING THE APRIL 25, 1989, PROPOSED PLAN PUBLIC HEARING

II.A. Comment.

Mr. Bill Witt, Environmental Manager, Dow Chemical Company, as representative for the PRPs or the Respondents noted that the Respondents performed a voluntary RI/FS at the Cliffs-Dow Site. The Respondents think they have developed a reasonable alternative which would provide equivalent environmental protection as it compares to the U.S. EPA preferred alternative.

II.A. Response.

The PRPs' preferred alternative would allow contaminated fill material to remain on-site indefinitely. The contaminated residuals would continue to leach to the groundwater for an indefinite period of time. There would also be a direct contact threat, under a future residential use scenario, which would remain. U.S. EPA believes that adequate protection of public health and the environment would not be met if theses wastes remain on-site without treatment. As such, U.S. EPA preferred alternative, including off-site disposal of all contaminated fill, would assure adequate protection.

II.B. Comment.

Dr. Swiatoslav Kaczmar, O'Brien & Gere Engineers, Inc., contractor for the Respondents summarized the actual field work performed during the RI, the groundwater bioremediation study conducted by Dow, the site endangerment assessment, and a recently performed test trenching program. Dr. Kaczmar made the following statements in his discussions:

1. "We conducted the biodegradation study and demonstrated ...that, the phenols, the cresols and the naphthalene... did, indeed become biodegraded within eight days. In less than two weeks we saw full biodegradation."
2. "Another very important adjunct to what we did was a test trenching program... we wanted to determine whether there were any tars within the fill, such as those present at the edge of the site...Our observations were that there was no stratification of tars present. There were no major deposits of tars..."
3. "A critical component of what we did is a risk assessment... with respect to the site... our conclusion was...the compounds ...did not represent an acute risk...'
4. "...the compounds that are present there do not warrant the potency factors that are currently being applied to them as benzo(a)pyrene."

II.B. Response.

1. The U.S. EPA agrees with your assumption that in-situ biodegradation maybe occurring in groundwater at the Cliffs-Dow Site. The laboratory studies conducted by the Dow Chemical Research Laboratory indicate that site conditions are favorable to such biological degradation of low-level contaminants in groundwater. The statement; "In less than two weeks we saw full biodegradation." is incorrect. The Dow study, at page 13, indicated that contaminant concentrations in groundwater were reduced by "greater than 90%" after two weeks. When applying conservative health based standards for carcinogenic PAH's in groundwater, a 90% contaminant reduction may still present health risks. U.S. EPA believes risks will be negligible, as such, has determined that monitoring groundwater is appropriate with a caveat for remedial action if conditions warrant.

2. The test trenching program described did not identify stratified tars or major deposits within the fill material. It did identify isolated tars which are "pure product" and will continue to release contaminants over time. To meet health based action levels these types of waste must be remediated.

3. The U.S. EPA presented a risk assessment in its proposed plan based upon a future residential scenario at the site. The groundwater at the site, does not pose either a carcinogenic or non-carcinogenic risk based on available monitoring well data. There is a potential over time that concentrations may increase and exceed either health based standards or Safe Drinking Water Act MCL's, if residual contaminant leaching were to increase.

4. The U.S. EPA's Office of Research and Development, Office of Health and Environmental Assessment has developed guidelines for carcinogenic risk assessment. For the PAH group of compounds the cancer potency factor for BaP is used for quantitative risk estimations, and applied to those compounds which are actual or possible human carcinogens (i.e. Groups A, B and C). It should be noted that there are uncertainties associated with the estimates of risks and the assumptions made in developing those estimations tend to be conservative, i.e., with a tendency towards overestimation. This method of risk calculation for PAH, applying the cancer potency factor of BaP to group A,B, and C carcinogens, provides for adequate protection of human health.

II.C. Comment.

Mr. David Svanda, City Manager, City of Marquette, indicated on behalf of the City of Marquette, that the health and welfare of the citizens are fully protected by the PRP preferred alternative. The PRP alternative also protects both short- and long-term interests of the City and is cost effective.

The City also believes that U.S. EPA's preferred alternative is unnecessary, excessive and wasteful of resources. Removal of 10,000 cubic yards of sand and woody material will not add to the protection of human health and the environment, and will waste valuable hazardous waste landfill space.

II.C. Response.

Each of the alternatives was evaluated using the U.S. EPA's nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). These criteria include:

1) **Overall Protection of Human Health and the Environment**
2) **Compliance with State and Federal Regulations (ARARs)**
3) **Reduction of Toxicity, Mobility, or Volume**
4) **Short-Term Effectiveness**
5) **Long-Term Effectiveness and Permanence**
6) **Implementability**
7) **Cost**
8) **State Acceptance**
9) **Community Acceptance**

The U.S. EPA preferred alternative provided the best overall balance when evaluated against the nine criteria which U.S. EPA uses in the decision making process. The ROD presents a complete evaluation of alternatives including the new PRP alternative proposal.

Analyses of fill material indicated that residual contamination was present in various media within the fill material and not limited to the tars only. Wood and sands are likely to contain residual contaminants and as such, must be properly disposed of. The U.S. EPA Off-Site Policy requires that all off-site disposal be restricted to RCRA compliant hazardous waste landfills. The off-site disposal component of U.S. EPA's preferred alternative in the Proposed Plan complied with this requirement.

II.D. Comment.

Mr. Buzz Berube, Mayor, City of Marquette, indicated that a landfill site similar to the Cliffs-Dow Site was remediated by the City of Marquette, with approval by the Michigan department of Natural Resources.

Although the PRP preferred alternative is not a quick fix, it is certainly as thorough as U.S. EPA's preferred alternative. It is also less costly. It should be the preferred alternative.

I would like to comment on your opening statement that you (U.S. EPA) have to satisfy the MDNR in the plan that you finally agree to be the one that is used at this site. Please help us talk to the MDNR to convince them that the PRP preferred alternative is environmentally safe and affordable.

II.D. Response.

All sites have their own specific conditions, U.S. EPA cannot compare its actions taken at a Superfund site to those actions taken at other non-Superfund Sites. The U.S. EPA must follow mandated requirements under CERCLA, the NCP and policy and guidance in conducting an RI/FS and selecting an appropriate remedial action for a Superfund Site. Specific evaluation criteria, as described in the response to comment II.D., must be followed.

CERCLA, Section 121(f)(1), mandates that U.S. EPA shall provide for substantial and meaningful involvement by the State in initiation, development, and selection of remedial actions to be undertaken in that State. The U.S. EPA does not require State concurrence prior to publication of the Proposed Plan or ROD. The U.S. EPA has allowed, as mandated by CERCLA, the State of Michigan active participation during the Proposed Plan and ROD process. The State of Michigan has concurred with U.S. EPA in both the Proposed Plan and ROD.

II.E. Comment.

Mr. Dave Hamari, Marquette Citizen indicated that: I have concerns that the site is close to the area Tourist Park which hosts the Hiawathaland Music Co-op Summer Festival, campers, and fishing off the dead River Bridge on County Road 550. It would be nice if the site was cleaned up.

I wonder if any fish are affected by any runoff from the Cliffs-Dow Site? Are there any contaminants in the fish?

I would like to have the water tested in Tourist Park Lake because kids and students swim there in the summer.

At what point are citizens of a community and college students paying for something that a major corporation did some 20 years ago?.

II.E. Response.

Your comments regarding recreational activities in the area of the site have been noted. The U.S. EPA has reviewed the site investigation reports and have evaluated potential receptors. The Dead River and Tourist Park Lake are not expected to be impacted by the Cliffs-Dow Site. Therefore, further sampling of fish or water sampling is not appropriate. The U.S. EPA acknowledges the recreational use and potential future residential use of the area and has prepared a ROD which would address those concerns by providing adequate protection of human health and the environment.

Liability under CERCLA is not preferential to any "person". Section 101(21) of CERCLA states that "The term "person" means an individual, firm, corporation, association, partnership, consortium, joint venture, commercial entity, United States Government, State, municipality, commission, political subdivision of any State, or any interstate body." The following persons have been identified as PRPs at the Cliffs-Dow Site: City of Marquette, Michigan; Georgia-Pacific Corporation; The Dow Chemical Company: and The Cleveland Cliffs Iron Company. Allocation of costs among the persons are their responsibility. In the case of municipal involvement at a site, the burden of costs may rest upon the taxpayers. U.S. EPA has no control in these matters.

II.F. Comment.

Ms. Gail Coyer, President, Upper Peninsula Environmental Coalition recommended that the parties proceed with the plan in two phases. Phase one would be the clean-up of 200 cubic yards of exposed tars. This would remediate the most serious environmental threat immediately. Phase two would review and resolve the more controversial element of whether to remove 9,600 cubic yards of fill material.

The standard which evaluates risks based upon a residential ingestion scenario appears unrealistic and there should be a more realistic standard to apply to more accurately evaluate the threat that this site poses.

The components of the tar which are present in the fill material are known or suspected carcinogens and could remain for a long time, longer than we can guarantee that the site will not be used for residential purposes. Also, a soil cap in a boggy area does not guarantee the integrity of the site in future years. The involved parties should negotiate standard for clean-up. If this disagreement goes to court, it will man years of delay in cleaning up the site and neither the environment or the residents will benefit.

II.F. Response.

The Phased approach to clean-up is a realistic concept and is commonly utilized by U.S. EPA where there are discrete units of contamination at a site. The RI/FS conducted for the Cliffs-Dow Site generated sufficient information in which the U.S. EPA can select remedial action for the site as a whole. The nature of the fill material is such that further investigations would not yield substantive new information. The U.S. EPA Proposed Plan preferred alternative combined components of a remedy which would address the principal contaminant sources (exposed tars), residual tars and residually contaminated fill. Since the source of contamination is removed, the groundwater would be monitored to assess adequacy of tar and fill clean-up. As part of public comment, the PRPs proposed a bioremediation alternative for residual contaminated fill material. The U.S. EPA has incorporated the enhanced biological treatment of the fill material in the ROD for the Cliffs-Dow Site.

The risk assessment calculations presented by U.S. EPA in the Proposed Plan conform to U.S. EPA guidance. The residential scenario, and soil ingestion rates are appropriate for use at the site, and are similarly applied at other Superfund Sites. Further explanations on U.S. EPA's risk assessment are presented in U.S. EPA response to comment I.A.

The U.S. EPA selects remedies which utilize permanent solutions to the maximum extent practicable. The U.S. EPA preferred alternative presented in the Proposed Plan offered a combination of remedial components which were presented in the PRP FS. Based upon the RI/FS and U.S. EPA's Proposed Plan, the Preferred alternative utilized permanent solutions to the maximum extent practicable and provided a balance between U.S. EPA's remedy selection criteria.

During the public comment period the PRPs conducted a treatability study for bioremediation of the residual fill material and proposed an alternative to that which U.S. EPA presented in the Proposed Plan. U.S. EPA has evaluated the PRP proposal and has determined that enhanced biological treatment of the fill material, after segregation of tars, is a logical outgrowth of the alternatives presented in the Proposed Plan. The selection of this component alternative in the ROD should alleviate concerns over delays in site clean-up caused by disputes between the parties over remedy selection. The selected remedy, described in the ROD, would provide for an equivalent degree of protection of public health, welfare or the environment.

II.G. Comment.

Mr. Richard Dunnebacke, Executive Director, Operation Action U.P. indicated that the companies associated with the Cliffs-Dow Site have been good companies for Marquette County. The way the companies handled wastes in those days was in a manner accepted at the time. The companies have diligently been working with authorities in coming up with something that's reasonable and doable.

The most concerning chemical involved at the site is benzene, the same thing we get on our hands whenever we have a spill in filling our gas tanks.

The remedial alternative presented by the PRPs would be four times less costly than the U.S. EPA preferred alternative. There is no proof that there is a higher risk by adopting the PRP preferred alternative. U.S. EPA's own statements regarding monitoring wells downstream point out that little or no contaminants travel very far from the site. It would be a waste of resources to spend valuable corporate resources and taxpayers' dollars for the U.S. EPA preferred alternative.

I would like to point out that the U.S. EPA did not evaluate the potential for enhanced bioremediation at this site despite growing scientific literature that proves it is feasible.

II.G. Response.

Historically, waste handling and disposal practices have improved due to the need to control the degradation of the environment and protect public health. What was common practice in the past may pose an endangerment today. The Superfund program addresses uncontrolled hazardous waste sites in accordance with CERCLA and the NCP. Under CERCLA, PRPs are given the opportunity to conduct studies, as is the case at the Cliffs-Dow Site. The Cliffs-Dow PRPs have complied with the majority of requests regarding RI/FS development from U.S. EPA. Those requests not responded to by the PRPs were completed by U.S. EPA within the Proposed Plan.

Based on analytical work conducted at the site, a site-specific set of indicator compounds were developed. Benzene was one of fourteen hazardous substances included in the indicator compound list. The carcinogenic risk assessment included benzene as one of six known or suspected human carcinogens used in risk calculations.

Each of the alternatives was evaluated using the U.S. EPA's nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). The cost of remedial action is one of nine evaluation criteria (see U.S. EPA response to comment II.C.). The U.S. EPA preferred alternative provided the best overall balance when evaluated against the nine criteria which U.S. EPA uses in the decision making process. The ROD presents a complete evaluation of alternatives including the PRP new alternative proposal.

During the public comment period the PRPs conducted a treatability study for bioremediation of the residual fill material and proposed an alternative to that which U.S. EPA presented in the Proposed Plan. U.S. EPA has evaluated the PRP proposal and has determined that enhanced biological treatment of the fill material, after segregation of tars, is a logical outgrowth of the alternatives presented in the Proposed Plan and is directly related to the concern which you expressed. The selected remedy, described in the ROD, would provide for an equivalent degree of protection of public health, welfare or the environment and be more cost-effective.

II. COMMENTS RECEIVED FROM THE PUBLIC DURING THE APRIL 25, 1989, PROPOSED PLAN PUBLIC HEARING

III.A. Comment.

Mr. William Blake, President/General Manager, Taconite Broadcasting Company, Inc. (Q107 WMQT fm radio).

Based upon his review of the comments of record from the U.S. EPA April 25, 1989, public hearing, the PRP preferred alternative would effectively deal with any concerns regarding public health and safety at this site. The additional cost of U.S. EPA's preferred alternative would provide little, if any, additional benefit and be a waste of money.

III.A. Response.

The transcripts of the public hearing provided only an overview of U.S. EPA's alternatives evaluation process. The RI/FS and Proposed Plan should be reviewed in addition to the transcripts for a more complete understanding of U.S. EPA's remedy selection process. The Proposed Plan presented an evaluation of each alternative using the U.S. EPA's nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). The cost of remedial action is one of the evaluation criteria (see U.S. EPA response to comment II.C.). The U.S. EPA preferred alternative provided the best overall balance when evaluated against the nine criteria which U.S. EPA uses in the decision making process. The ROD presents a complete evaluation of alternatives including the new PRP alternative proposal.

III.B. Comment.

Ms. Susan Holloway, Student-Northern Michigan University (NMU).

Why did the ARARs section of the Proposed Plan not discuss the wetlands section of the Clean Water Act? Isn't a bog lake a wetland? Did the companies have a permit to fill in the lake? Don't they have to restore the bog lake or forever preserve another lake? Bog lakes are an important part of our ecology in the Upper Peninsula of Michigan and should be preserved.

III.B. Response.

The U.S. EPA has determined that Section 404 The Clean Water Act (CWA) is not an ARAR for the Cliffs-Dow Site. It is true that a bog lake is a wetland, if certain physical features are present. The Cliffs-Dow fill area is described as a "bog lake" but those physical features associated with a wetland no longer exist at the site.

There were no Federal permitting requirements at the time the wastes were disposed at the Cliffs-Dow Site. As such the actions taken by the companies were acceptable. U.S. EPA agrees that the preservation of wetlands across the nation is an essential part of environmental protection and restoration of wetlands be conducted whenever possible. If a wetland were to be filled today, Section 404 of the CWA would require that mitigative measures must be taken to restore or create another wetland.

III.C. Comment.

Ms. Gayle Coyer, President, Upper Peninsula Environmental Coalition.

I am writing to clarify comments made at the public hearing on the Cliffs-Dow Proposed Plan. It appears that some people in attendance interpreted my remarks as recommending the PRP preferred alternative. This is not what I recommended. I recommended proceeding with the action in two phases and to negotiate the health based risk standard for the fill. My position is that we still don't know the realistic threat that the fill materials at the site poses.

III.C. Response.

Your comments made during the April 25, 1989, Proposed Plan public hearing are on the record and are addressed in U.S. EPA's response to comment II.F.

III.D. Comment.

Mr. Jerome A. Roth, Professor of Chemistry-NMU.

The difference between the two proposals (PRP and U.S. EPA) seem to revolve around the fate of the fill and not removal of tars. Removal of all fill would likely improve the rate of recovery of groundwater quality. However, since drinking water standards are currently not exceeded, the fill may be an unnecessary part of the remedial action. Deed restrictions should alleviate concerns over groundwater ingestion since access is limited. The concern that citizens may ingest tars or fill material is unlikely once the site is capped. The well-defined nature of the site allows for complete coverage with certainty.

As a citizen and taxpayer of Marquette, I would much rather see the cost differential between the two alternatives spent on other urgent environmental problems. A small city has a difficult time funding such ambitious projects.

I urge you to negotiate a compromise on the fill issue before reaching a final decision.

III.D. Response.

The U.S. EPA agrees that the rate of recovery of groundwater will improve if the source of contamination is removed. The use of deed restrictions as a remedial action alternative for either groundwater or soils is inappropriate. The site is currently zoned recreational, as such, the public is allowed access. The preamble to the proposed National Contingency Plan (NCP), 53 Fed. Reg. at 51423, states that: " ... institutional controls such as water and deed restrictions may supplement engineering controls for short- and long-term management to prevent, or limit exposure, to hazardous substances, pollutants, or contaminants. Institutional controls will be used routinely to prevent exposure to releases during the conduct of the remedial investigation and feasibility study, during remedial action implementation, and as a supplement to engineering controls designed to manage waste over time. The use of institutional controls to restrict use or access should not, however, substitute for active response measures (treatment and/or containment of source material, restoration of groundwater to their beneficial uses) as the sole remedy unless such active measures are determined not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of remedy. (Emphasis added).

The potential future use of the site would not make capping feasible for eliminating the direct contact risks. The leaching of concentrated tars within the fill would not be precluded through the use of a cap. The cap may be violated by tresspassers or wildlife. Additionally, the general climatic conditions are not favorable for cap integrity.

Each of the alternatives was evaluated using the U.S. EPA's nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). The cost of remedial action is one of the evaluation criteria (see U.S. EPA response to comment II.C.). The U.S. EPA preferred alternative provided the best overall balance when evaluated against the nine criteria which U.S. EPA uses in the decision making process. The ROD presents a complete evaluation of alternatives including the PRP new alternative proposal.

The U.S. EPA is aware of the monetary constraints which municipalities face. CERCLA does not provide relief for municipalities as PRPs. At those sites where municipalities are determined to be PRPs, the burden of costs may rest upon the taxpayers. U.S. EPA has no control in these matters.

Consistent with CERCLA and the NCP, the U.S. EPA is responsible for the protection of public health and the environment. Such protection is not "negotiable", but different alternatives may be selected which provide for equivalent protection and an acceptable balance among the nine criteria. Certain components of the PRPs proposal for enhanced biological treatment of the fill material has provided U.S. EPA sufficient information upon which the ROD selects this component alternative.

III.E. Comment.

Mr. James J. Scullion (Retired), Pres. & Chief Exec. Officer, Lake Superior & Ishpeming R.R. Co.

I can see absolutely no practical reason for what I feel is an unwarranted degree of cleanup. The area involved is not a residential or high use area. Being involved personally in prior years in relocating disposal area, it is always our practice to utilize just such areas as this - of little value and little use.

III.E. Response.

The U.S. EPA has evaluated each of the alternatives using the U.S. EPA's nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). The cost of remedial action, as well as both short and long term-effectiveness are decision making criteria (see U.S. EPA response to comment II.C.). The U.S. EPA preferred alternative provided the best overall balance when evaluated against the nine criteria which U.S. EPA uses in the decision making process. The ROD presents a complete evaluation of alternatives including the new PRP alternative proposal.

Although the site is not currently residential, it is zoned recreational and there are no assurances that rezoning will not occur. As a recreational area frequent trespass is likely.

The Superfund program addresses those sites in which past waste disposal practices may pose an endangerment to public health or the environment. In many instances the waste disposal practices may have been acceptable at the time, but could pose such endangerment today. Additionally, the waste disposal locations may have been considered "ideal" then, but would be in violation of both Federal and State environmental regulations today.

III.F. Comment.

Rev. Louis C. Cappo, Chairperson, Lake Superior Jobs Coalition.

The additional costs of the U.S. EPA proposal as compared to the PRP proposal represents a waste of taxpayer and corporate dollars. The off-site disposal is an absolute waste. It is like burying 3 or 4 million dollars in the ground. I urge you to reconsider your proposal.

III.F. Response.

The U.S. EPA has evaluated each of the alternatives using the U.S. EPA's nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). The cost of remedial action, as well as both short- and long-term effectiveness are decision making criteria (see U.S. EPA response to comment II.C.). The U.S. EPA preferred alternative provided the best overall balance when evaluated against the nine criteria which U.S. EPA uses in the decision making process. The ROD presents a complete evaluation of alternatives including the PRP new alternative proposal.

The off-site land disposal which was proposed by U.S. EPA would be at a secure RCRA compliant hazardous waste landfill. Such landfill is monitored to assure effectiveness of its' containment system. The transfer of the waste from the Cliffs-Dow Site to the secure landfill would provided an acceptable balance among the remedy selection criteria used by U.S. EPA when the Proposed Plan was published.

III.G. Comment.

Mr. Dave Hamari, Marquette Citizen.

The Presque Isle Ave. and the Cliffs-Dow Sites should be cleaned up to limit human exposure and protect groundwater.

III.G. Response.

The U.S. EPA has presented a preferred alternative in its' Proposed Plan and has selected an alternative, based upon public comment received, in the ROD. The studies conducted and the remedy selected are for the Cliffs-Dow Site. The selected remedy would limit exposure and protect groundwater from further degradation, thereby alleviating your concerns over public health protection and environmental degradation.

The Presque Isle Ave. Site is not a Superfund site and will not be addressed by U.S. EPA. Inquiries regarding the Presque Isle Ave. Site should made through the MDNR, Marquette District Office.

III.H. Comment.

Mr. D. J. Jacobetti, Chairman, House Appropriations Committee, State House of Representatives.

The comments made at the public hearing indicate a lack of support for the U.S. EPA preferred alternative. Taxpayers believe that the U.S. EPA preferred alternative goes beyond what is necessary and represents a waste of taxpayers money. The U.S. EPA preferred alternative goes against U.S. EPA's criteria for handling this type of problem by transferring the waste to another area of the state.

I understand that the PRPs have offered a compromise plan which would use bioremediation to deal with the fill material remaining at the site. I urge U.S. EPA to consider this proposal.

III.H. Response.

The U.S. EPA has evaluated each of the alternatives using the U.S. EPA's nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). The cost of remedial action, as well as both short and long term-effectiveness are decision making criteria (see U.S. EPA response to comment II.C.). The U.S. EPA preferred alternative provided the best overall balance when evaluated against the nine criteria which U.S. EPA uses in the decision making process. The ROD presents a complete evaluation of alternatives including the PRP new alternative proposal.

The U.S. EPA is aware of the monetary constraints which municipalities face. CERCLA does not provide relief for municipalities as PRPs. At those sites where municipalities are determined to be PRPs, the burden of costs may rest upon the taxpayers. U.S. EPA has no control in these matters.

Consistent with CERCLA and the NCP, the U.S. EPA is responsible for the protection of public health and the environment. Such protection is not "negotiable", but different alternatives may be selected which provide for equivalent protection and an acceptable balance among the nine criteria. Certain components of the PRPs proposal for enhanced biological treatment of the fill material has provided U.S. EPA sufficient information upon which the ROD selects this component alternative.